SCIENCE AND INDUSTRY

# ORGANIC GARDENING

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### Important Debate in the House of Lords (London)

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ON October 26th, 1943, a notable debate was held on the subject of organic farming as advocated by Sir Albert Howard in the House of Lords. The purpose was to get the English Government to appoint a commission to study into the benefits of farming without the strong chemical fertilizers. The discussion is of such great interest to our readers that we are reproducing the entire discussion in this issue.

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**Rodale Press** **Emmaus, Pa.**

# ORGANIC GARDENING

EMMAUS, PA.

Vol. 4, No. 1, Dec., 1943 | $3.00 a year | 25c a copy

J. I. Rodale, Editor | Sir Albert Howard, C.I.E., M.A., Associate Editor


## *With The Editor*

### TO PLOW OR NOT TO PLOW

A BOOK has recently been published by the University of Oklahoma Press entitled *Plowman's Folly,* by Edward H. Faulkner which denounces the use of the mouldboard plow. This book advocates merely discing and harrowing the land. A great many persons interested in the organic method of farming seem eager to embrace this new theory, perhaps in their subconscious mind associating the plow with the high-production and artificial methods of present-day commercial farming. They should bear in mind, however, that while the plow might cause trouble under certain conditions, it is a safe and efficient tool where compost is used in the soil as the fertilizer element.

This book has created a sensation in the public prints. Magazines like Time, Newsweek and Readers Digest and every cross-roads newspaper have discussed the book in a favorable light. "Down with the plow—the curse of modern agriculture", they say. They know that something is wrong with our method of tilling the soil. This must be it.

I knew of Faulkner's theory through articles in Country Life and our own Organic Gardening and decided to try this method on our farm. Of a six acre tract planted to winter wheat, we plowed one-half while only discing and harrowing the other portion. Incidentally, it required a good deal of extra labor in the "no-plow" portion on account of the extra discing required to get the weeds worked into the soil.

The results were quite negative where no plowing was done for the reason that the weeds had a field day. Where land is plowed, the fresh weed seeds are "done" under and by the time they work their way up the wheat is way ahead of them. In the "no-plow" section the weeds came up faster than the crop, the result being a very poor stand of wheat compared to the other three acre section.

Another reason why there was no thick stand of wheat was that the drill machine that planted the seed was badly hampered in its work by the stubble and plant residues on the surface which were not plowed under. I can't conceive of a machine being perfected that can give a perfect cover-


Read Magazine, Inc. Executive and Editorial offices, 6th and Minor Sts., Emmaus, Penna. Subscription rates 12 issues for $3.00. **ORGANIC GARDENING**, published 12 times a year by Read Magazine, Inc., 6th and Minor Sts., Emmaus, Penna. Entered as second class mail at the postoffice at Emmaus, Penna., under the act of March 3, 1879. Printed in U.S.A.

age of seed when there is so much trash on the surface. Imagine a previous crop of corn with thousands of stalk stumps per acre and try to visualize the laying down in it of seed for wheat, oats or any other close-growing crop. Mr. Faulkner also admits that you could not disc down the sod of such previous crops as alfalfa and other grass pastures. These would have to be plowed under.

We tried the "no-plow" method in our 1943 vegetable garden with devastating results as far as weeds were concerned. They came right up with a vengeance and you couldn't tell plant from weeds. The weeding labor was all out of proportion to the economic value of the crop. We have seen wonderful vegetable gardens, though, where the seed bed was prepared by plowing.

Faulkner asked thousands of farmers why they plowed. He said they didn't seem to know, except that it was to get rid of weeds. Well, that was a rather potent reason. Faulkner in his writings forgets himself and shows the great value of the plow for keeping weeds in check. In talking about the invention of the mouldboard plow by Jethro Tull a few hundred years ago he says, "Their land was foul with perennial weeds which were always in the way of their farming, and would grow higher than their planted crops unless they were kept in check. With the mouldboard they could now avenge themselves on these enemies, and could add other acres to what they had been able to till before."

There is a farming section in the Great Plains region around Missouri in which what is called dry-land farming is practiced. The soil is sandy and the rainfall is extremely low, 25 inches a year instead of the 40 inches we have in the East. Special tools have been designed for farming there. There is a lister which has V-shaped sweeps which are drawn underground four to six inches. The ground underneath is rippled while the surface is not disturbed. It is claimed that ordinary plowing there would cause the soil to blow and erode. If organic farming in these dry-land sections were practiced and the soil enriched with compost instead of chemicals there possibly would not be any need for special tools or a special kind of farming.

I purchased one of these listers. It was shipped all the way from Nebraska. In an experimental trial our tractor couldn't begin to pull it, our soil being clayey and compacted due to a decade of bad farming practices of the previous owners. A neighbor came to our aid who had a heavier tractor. Still, the lister wouldn't be pulled successfully. We are keeping this infernal machine and will try it again in a few years when our soil has become softer with the yearly addition of compost.

Nowhere in his writings does Faulkner mention the menace of the tractor which, by its own weight, compacts the soil. That is by far a greater wrong to the soil than plowing could ever possibly be. The ideal condition is a loose, porous earth which breathes. Now there are even heavier pieces of equipment such as the grain combines which are exerting exceptionally heavy weight on the land. Sir Albert Howard was called to see a vegetable garden where the aphis were making inroads. He noticed that some rows were immune to this pest. Upon observation he noticed that the pest was persent only in those rows where the soil was compacted. In the immune rows he found the soil quite loose. I have followed behind the plow and watched the soil lift up and then fall. If this doesn't loosen and aerate the soil I don't know what will. Where you do not plow and in its place you have to disc a few extra times, you are weighing down the land *that* much more with your tractor.

Another thing that throws a shadow on this theory is the experience of Wisconsin farmers. A recent annual report of the University of Wisconsin Agricultural Experiment Station stated that corn yields were reduced by 1/3 or more when a farmer merely disced down a rye cover crop before planting corn. It recommended plowing cover crops under.

One of the main contentions made by Mr. Faulkner is that when green matter of the surface is plowed under, it destroys the capillary action of soil water. Such organic matter, he says, absorbs much water from below as well as above it, thus acting as a barrier, preventing the water from below from reaching the surface by the usual capillary action of the soil. It is a sort of dog-in-the-manger. Yet Faulkner admits that an acquaintance of his, a crop specialist with a 20-year background of experience said, "Tests show that there isn't much capillary movement in the soil as we believed existed —it's really unimportant in many cases." Here again it makes a big difference whether you are plowing under a hard-packed soil, or one rich in organic matter, through years of

organic farming. Where the soil has the crumbly, spongy consistency which is produced by composts it has the characteristic of retaining moisture and will not give it up to any fresh green matter plowed under.

The biologic life of the soil must be considered. If there is a serious impairment of the capillary action of the soil water, as Faulkner claims, then the beneficent soil organisms begin at once to restore normal conditions, right after plowing. The bacteria, fungi and algae are present in tremendous quantities where the soil is rich in organic matter. They start by going to work and breaking down the green matter that has been plowed under. Here is where the earthworms play an important role. They bore thousands of holes per acre right up to the top, going right through the green matter to eject their castings on the surface. These holes would draw water from below and permit the rains from above to seep down into the earth. Where there is a pronounced biologic life in the soil you will find a fine flexibility, a softness, an ability to keep things going under adverse circumstances.

To conserve as much value of compost as possible it should be plowed under. In merely discing it in, some will remain on the surface and the action of the sun will dry it out and dissipate some of its substance. Experiments showed that where manure lay on the surface for three days, it lost about 15% of its value. This is another important reason for plowing.

Faulkner suggests also that the residues on the surface will absorb much rain water which otherwise would run-off and cause erosion. This is one of the most important advantages also of organic farming. Where the soil is rich in humus, rain water is almost completely absorbed. On such land you never see water puddles. These surface residues will not decay for a few years, but when plowed under they will completely break down and become part of the soil as valuable humus in a few months, especially if your soil is organically rich.

It is not the plow that is running down our soils. Try to tell the Pennsylvania Dutch farmer at Lancaster, Pennsylvania not to plow. They have plowed for several hundred years. Their farms today are in such wonderful condition of fertility that acreage there commands fabulous prices, even though their principal crop is tobacco which draws hard on the soil. What is the magic they employ? Nothing more than that they have always engaged in mixed farming with a strong accent on livestock, and its by-product of manure. It is only recently that an occasional tractor is seen on their farms. I have noticed also that these farmers get all the manure at the Lancaster stock-yards and put thousands of tons of it on their farms each year.

Perhaps some day there will be a revolution in farming tools which will bring about a change in the method of tilling the soil. There is a piece of equipment called the ROTO-TILLER which is made up of a row of whirling knives which plows, discs and harrows in one operation. It is a small, expensive tool, practical only for truck farming on not too big a scale. It provides a beautiful seed bed, but would get damaged in a stony soil. It also kills earthworms. There are plans to put a larger model on the market after the war.

Then there is the disc plow, which piles up the earth at an angle rather than completely turning it over. This is a compromise well worth considering. The best solution of all, however, is to concentrate on the one main purpose of enriching the soil with humus. Thus will the earth act without temperament under all kinds of conditions.

J. I. Rodale

# *Hints For The Victory Gardener*

**This is the thirteenth of a series of articles by this author dealing with the cultivation of ordinary vegetables**

**By Roger W. Smith**

## RADISHES

THE growing of a handful of red radishes has often served as a first lesson in the art of growing root vegetables. Many who are now master-gardeners were initiated by the homely radish. Radishes have importance as a salad vegetable. They are particularly valuable to the housewife because they may be cut to form elegant rosettes to decorate the salad bowl to which they add a very desirable and piquant flavor. Because of the household demand for them, your interest naturally will be centered around their steady and satisfactory production.

Radishes are easy to grow. They are not particular as to type of soil but they do demand that this be rich, moist, and well pulverized, and that it contain a generous amount of fertile humus. You will note this demand for humus. It is best supplied by incorporating with the soil material well broken down in the compost heap, as an alternative you will have to depend upon well rotted manure. Radishes may be grown in sand and water but tests have shown them to be lacking both in flavor and food value.

The origin of the radish is ancient and obscure. China, Asia, many lands claim it. You will better understand this confusion when you observe the great variety this plant shows and its many related forms. Red radishes, white, scarlet, crimson, black—they are all relatives of the numerous cabbage family.

A handful of red radishes—the good gardener doesn't dismiss them at this point. In the meantime, he has learned of other forms varying from the delicate little, scarlet-rooted Saxa, which matures its crisp root about fifteen days after seed planting, to the massive Sakurajima radish whose roots often weigh over fifty pounds apiece and the marvelous parsnip-rooted N a r i m a whose white, crisp roots are often three feet long.

For convenience radishes are often classified in types as early, summer, and late. In general there are early spring maturing radishes for spring or fall planting, white rooted types for summer planting, and the slow g r o w i n g, black-rooted types for winter use. The black-rooted type deserve your attention. You will likely discover during your work, that the quick-maturing, annual radish you so casually planted is associated with perennial types that are propagated from root cuttings. You might well spend many a happy hour in planting and cultivating the many amazing varieties of this fine plant.

In general you will note that this plant is hardy, that is, resistant to cold; that it will not flourish in hot, dry weather although some of the summer types have been developed because of their resistance to heat. Radishes are one of the earliest salad plants to mature. They thrive best during the cool of spring and fall.

Very early in the spring in ground which has been deeply dug and well prepared, a trench about two inches deep and as long as required should be formed using the corner of the hoe. If you use a guide line, this will help you to keep the trench straight. A one inch layer of mature compost humus should be placed in the bottom

of the trench. Upon this material the seed should be placed evenly spaced and about fifteen seeds to one foot of row.

The seed should then be covered with a half inch of sifted top soil. Many good gardeners believe that if the seeds are deeply planted, say one or two inches deep, the roots formed will be much larger, firmer and crisper than those produced by shallow rooted seed, say seed planted one quarter of an inch beneath the surface. These gardeners offer much indirect evidence to support their claim and you might like to make a few tests of your own. Does the radish root benefit by the greater coolness? You will remember that tulip bulbs tend to form additional bulbs when shallow planted and larger bulbs and flowers when deeply set. Does this principle hold good with roots of the radish type? Whatever the answer, radishes delight in coolness. Experimentally they have been grown on the surface of snow with only the top roots reaching to the soil.

For early spring culture Crimson Giant and French Breakfast are excellent sorts. They are equally valuable for fall planting. You will find it advisable to seed a short row every ten days or so to secure a succession crop during the period favorable to r a p i d growth for these types mature in about twenty-four days.

The period during which radishes are best fitted for pulling lasts only a day or two. In this matter the little radish will explain to you that all garden crops reach a certain point of perfection at which time they should be gathered. If radishes are harvested too soon they are immature, if the harvesting is too late they are hard, small and over-ripe. With little loss if you fail, your row or two of humble red radishes are very competent to explain this matter to you.

For warm weather planting White Icicle and White Vienna radishes give good results. They mature in about thirty-three days. If you take care to see that they receive ample moisture during dry spells you should have no difficulty in succeeding with them. If urgently required, the rows may be flooded in the evening, but if a large supply of moisture-holding compost material has been dug in sometime before planting time, this irrigation should be unnecessary. You will soon discover for yourself that steady and rapid root growth is essential for the formation of fine roots. Roots slowly formed because of lack of moisture and plant nutrients are usually woody and excessively pungent whilst those irregularly oversupplied with these things are usually pithy, woolly, or even hollow.

Radishes are fairly free from insect enemies. They are quite free from plant disease. However, they are sometimes affected by root maggots. For this reason, radishes are sometimes planted with onions as a trap crop, that is, they are planted for the sole purpose of attracting the maggots away from the onion roots. The maggot-infested r o o t s are, of course, afterwards removed. But should root maggots, wireworms, borers, etc., be excessively active in your garden, these may be controlled by the application of large quantities of unleached wood ashes. At the same time, it is worth noting that if the soil of your garden is improved by the use of liberal amounts of mature compost humus, these pests will soon become a thing of the past.

Because of their quick germination and r a p i d growth radishes are frequently used to mark rows in the garden. Radish seed is often mixed with beet seed so that the sprouting radishes will mark the row and make early cultivation possible.

Whilst you are planting your summer radishes you will possibly decide to try out a row or two of the slow-growing winter radishes, Long Black Spanish or Round Black Spanish, both of which mature in about sixty days. The root of these is pure white beneath a tough, black skin. This skin is best removed in the kitchen. But there are also white varieties of winter radishes, White Chinese is an example. China Rose has flesh of white but a very deep rose-tinted skin. The roots of these are about six inches long and they also mature in about sixty days.

Early maturing radishes are planted for succession crops. Winter radishes, on the other hand, are usually planted so that the whole crop will mature at about the same time, to facilitate harvesting and storage.

Most of the winter radish crop is stored for future use. It is here that a few rows of radishes will serve to introduce you to the problems involved in the storage of root crops in the garden. Since radish roots are very resistant to cold, they are ideal so far as the beginner is concerned. Their storage is easily arranged by placing them in a well drained, straw-lined trench and covering them with two or three alternating layers of straw and earth. This storage is best ar-

ranged after the first fall frosts have arrived. Leaves or dry litter may be used in place of straw. And simple as the matter sounds, you will get much satisfaction out of doing it with success.

So from the planting of early spring radishes you have progressed to the growing of the larger rooted, heavier types. It is but a step then to the making of plans for the planting of horse-radish which is usually grown from root cuttings, has to be dug up a couple of times to remove side roots, replanted, and is something else again.

Or your interest may have been directed into other channels. Through the discovery that a few neglected plants have bolted and run to seed you may decide to save the seed of some of the pods. This seed may be planted the following spring and success reasonably assured. There is little chance that it has been damaged by crossing with some undesirable form. There is even the possibility that with persistence you might, in this way, develop a type of radish peculiarly suited to your locality.

Experimentally, the radish has been crossed with the cabbage. As you will readily understand, the resultant hybrid has many points of interest. But it will not cross with either of its parent forms, that is, the radish-cabbage will not cross back with either the radish or the cabbage. This of course, is a very serious defect. But to offset this stubbornness, it was found that this new plant form would readily cross with many related forms of the cabbage family, notably such members as the rutabagas and the turnips.

This characteristic was, of course, quite unexpected. It was well known that neither the radish or the cabbage could be crossed with either turnips or rutabagas. Here then was a new plant form, the radish-cabbage, over which many of these forms which had never previously been connected could be joined, over which desirable traits could be passed.

Thus the humble radish has opened up a vast and fascinating new territory for experimentation out of which will undoubtedly issue many excellent and surprising new plant forms.

A few rows of red radishes. They will bring you much gratification. More than likely you will later on recollect that it was in the planting and growing of them that they introduced you to many elementary garden problems, that led eventually to your better understanding of the ancient art of gardening, to the successful production of healthful foods to be used for the sustenance of yourself and your family.

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# *Adaptability of the Municipal Compost Scheme*

### An Appeal to the Larger Municipalities

By J. P. J. VAN VUREN,

Co-Ordinating Officer, Municipal Compost Scheme.

(Ficksburg, O. F. S.)

From the South African Municipal Magazine — March, 1943.

BASING one's judgment on financial independence, and taking that as an index of capability, there is only a very small percentage of the municipalities in South Africa that can boast of tackling without fear or worry any new and feasible proposition. Lack of funds is usually one of the biggest drawbacks as far as progress and independence is concerned. If, however, a scheme is brought forward with a one hundred per cent. adaptability, cheapness, simplicity and elasticity, then there is a considerable amount of blame to be

put on the heads of those bodies that do not adopt it.

The above qualifications and advantages are the keynotes of success in the present Union-wide, Government-sponsored municipal compost scheme. No matter how small or how large the community, whether it be a mere village or a city, the scheme can very easily be adapted to fit specific conditions.

A modern water-borne sewerage scheme is without any doubt the most convenient and hygienic way of getting rid of nightsoil. But how many towns, not to mention villages in the country, are in a position to-day or ever will be in a position to adopt such an expensive undertaking? To them the modern compost scheme, though less convenient, but if properly carried out, almost as hygienic, is not only less wasteful but may be regarded as the most economic and convenient way of treating not only their night soil but at the same time the other town refuse. In their case the compost scheme may be the nearest to the ideal, almost cherished water-borne sewerage scheme, that they may ever hope to realise.

### *Source of Income*

Apart from the fact that the adoption of such a compost scheme will do away with the present systems of dumping of household and town refuse and burial of nightsoil in trenches, both very wasteful and unsanitary procedures, experience has shown that a considerable amount of income may result from such an undertaking. At the same time, these dangerous sources of disease infection are eliminated, as it is generally found that these dumping sites afford ideal breeding places for flies, mosquitos and rats, who in their turn may carry some of the most infectious and fearful diseases back to the urban areas. Furthermore, as these disposal systems act as a constant and everlasting drain on the funds of any municipality, by adopting the compost scheme they have at least the chance of seeing some, if not all, of the money spent on this item recovered.

Even though some of the bigger towns and cities in the country are fortunate enough in having a water-borne sewerage scheme, only a few of them can boast of having perfectly controlled disposal works. Having had the opportunity of visiting practically every town and city in this country, I have come to one definite conclusion: *In general, far too much stress is being laid on the efficiency, infallibility and hygienics, not so much on the intake and conveyance—that part on which the average citizen bases his conclusion—but on the ultimate disposal of collections, in a water-borne sewerage scheme.*

Not only are many of these water-borne sewerage schemes in the country to-day incomplete, but the disposal works are definitely inefficient, in as much as there is a total absence of the necessary plant and installations to ensure proper control of the final effluent and sludge. I have been astonished to find, contrary to what I was given to believe, so many flies breeding at some of the disposal works and the indifference and almost recklessness of some of the authorities regarding the possible spread of disease through the medium of inefficient disposal works. Whether these out-of-date schemes are due to a lack of the necessary funds for proper completion, lack of foresight at the time of erection, indifference or any other reason, one is nevertheless inclined to arrive at the aforementioned, unbiassed conclusion.

### *Less Expense*

To such municipalities, of which there are quite a few in the country, the compost scheme comes as a blessing. Even then one may find some that do not recognise it as such. Instead of installing expensive sludge digestion tanks, these may as well be omitted and the sludge directly used in the composting process, the necessary pits of which are much cheaper to erect. This will not only mean less expensive sewage disposal works, but at the same time the refuse, of which there are usually vast quantities and which could otherwise not have been changed with such rapidity to a valuable fertilizer product, would now, in such circumstances, be utilised.

The same applies to those municipalities where the sewage scheme has in the meantime, with the expansion of the population, become too small to handle all the sewage. Instead of enlarging their disposal works, they could easily switch over to using the excess as well as the usual quantity of sludge for composting purposes. In this way the enormous quantities of valuable organic materials which found their way from the farms —the soil—to those big towns and cities can be changed to compost and returned to the soil, instead of being dumped somewhere on the commonage or being turned into smoke by incineration.

*Use of Sludge*

This Government appeal to municipalities to manufacture compost is too much regarded as being made only to towns and villages where nightsoil is available. Nightsoil constitutes only a very small proportion of the ingredients of municipal compost. Its principal advantage, apart from the fact that it contains valuable plant food, lies in its nitrogen content, which serves as food for the bacteria that bring about fermentation and eventual decomposition. Cities and towns with water-borne sewage schemes regarded themselves as automatically exempted from this obligation and appeal. Sewage sludge could just as well as nightsoil be utilised in the compost process. At Bethlehem such a scheme is actually in operation to-day, where sludge is used with excellent results.

In the foregoing it has been pointed out that the compost scheme could without any difficulty be adapted to towns and villages where nightsoil is available, mainly due to its cheapness and simplicity, and to cities and towns where difficulties are encountered with their disposal works, on account of the elasticity of the scheme. I shall now endeavor to show how a compost scheme is also possible in those cities where the final effluent and sludge is properly disposed of either by having outlets for these into the sea or proper installations.

In this case compost could still be made, but on a different principle. Here the typical Indore process may be adopted, and in this connection I should like to mention the name of Mr. P. Robertshaw, the Director of Parks and Gardens in Durban, who has done some valuable pioneering work in this direction by manufacturing about 400 tons of excellent compost annually from organic materials originating from the 50 acres of the Botanic Gardens. These consist chiefly of vegetable matter such as leaves, lawn and grass cuttings, flower stalks, etc., household refuse, kitchen garbage, sweepings, paper and similar soft materials. Out of this material compost is manufactured by using 75 per cent. of such refuse and 25 per cent. stable manure, which is bought from the Corporation's stable. No pits are required in this process. The different materials—refuse and stable manure—are stacked in alternate layers and watered. Stable manure in this case is used as the "starter" instead of nightsoil and sludge.

*Elastic Process*

This process is so elastic that it may be altered at will to suit specific conditions. Where no stable manure can be obtained in suitable quantities, compost from a stack 10 to 15 days old may be used instead with just as good results. Once a scheme is in operation enough of this "starter" will become available to innoculate any number of compost stacks. While it is not necessary to limit oneself to the materials mentioned above, any material of vegetable origin, such as market, ashbin, abattoir refuse, etc., may be used with excellent results.

If one considers the fact that 400 tons of compost is annually produced from 50 acres of park and garden refuse, then the figure will undoubtedly run into thousands of tons of compost if our big cities would only utilise material from this source alone in their respective areas. If the scheme, however, is expanded to include the actual refuse from their markets, ashbins, abattoirs, streets, etc., this ultimate quantity of compost that could be produced could easily be doubled or trebled. After all, it is from these big cities that our main supplies of compost will eventually come, as they are the main depots of the products of our soil. This is their honest duty towards the soil and towards the country in order to complete the *wheel of health* and *fulfil the law of return.*

The Department of Agriculture and Forestry is making an urgent and necessary appeal to *all* municipalities in the country to produce compost, to utilise the waste that is annually accumulating or daily being sent up in denser clouds of smoke. In order to produce foodstuffs and enough of it to fulfil our increased needs during wartime, our soils must be fed. Karroo manure, our only other source of supply of organic fertiliser, is, due to acute shortage of mineral fertilisers which we have to import, being used up at the rate of 500,000 tons annually. These deposits have accumulated over a period of a century or more, and once the supply is exhausted, it is irreplaceable. We must have an organic fertiliser to substitute for Karroo manure, whether there is a war on or not. Compost is the only other substitute. The duty and responsibility with regard to making this necessary product available lies with the municipalities. Not only will the needs of our soil be fulfilled, but by producing compost urban areas

will in the end become cleaner and their respective communities healthier and happier.

In conclusion, I trust you will allow me to mention yet another personality in the field of compost making, whom I should like to mention by name as one of the pioneers in municipal compost production in this country—Dr. P. le Fras Nortier, of Clanwilliam. Being one of Nature's most able and keenest students, years ago he recognised the importance of the work done in this connection in India, and went so far as to put the ideas into practice at Clanwilliam. His pioneering work in this direction is fully recognised and appreciated by those of us who realise what it means to break ice in this direction.

# *Milk-and-Manure Top Dressing*

## REGENERATES DAIRY HERD

### Tokoroa Farmer's Important Discovery

By the Editor

**To have abandoned altogether the use of artificial fertilizers and have transformed in four years 28 per cent. of sterility in his dairy herd into 98 per cent. of his cows in calf, is the achievement of Mr. S. M. May, Tokoroa, R.D., Putaruru. Mr. May is a member of the N.Z. Humic Compost Club and of the Bio-Dynamic Association of Farmers and Gardeners. Mr. May attributes his results mainly to his use of a novel top-dressing, consisting of cow-yard washings and skim milk fermented together.**

From the COMPOST CLUB MAGAZINE
(Auckland, New Zealand)

MR. MAY farms 266 acres of pumice lands. Of this 200 acres are in grass and crops, and the balance in scrub. In 1935 and 1936 Mr. May topdressed his land with 3 cwt. of superphosphate to the acre. He then changed to basic slag, which he applied in 1937 and 1938 at 3 cwt. per acre. But for some years he had been becoming increasingly doubtful about the truth of the theory of chemical agriculture.

*Clover Replaces Twitch*

"In the spring of 1939," said Mr. May, when he recently called on the Editor of "Compost," "I started fermenting my cowyard and shed washings with skim milk pumped into a 3,000-gallon concrete cistern. I was warned by neighbours and others that if I used this for topdressing it might coarsen the grass and largely eliminate the clover from my pasture. It did neither. On the contrary, on one paddock which had a heavy growth of twitch and has been topdressed with nothing but the milk and washings for three years there is now an increasing growth of clover, timothy and ryegrass. The twitch is dying out and the other grasses are replacing it. When I got down and parted the growth I found an inch of black humus on top of the soil, and earthworms in thousands."

Mr. May said that when he used to run only the manure washings into the cistern its contents used to smell so badly that one could hardly bear to go near it. But when the milk was added, and a frothy fermentation took place, the smell stopped and the liquid became quite sweet and pleasant to apply.

*A Simple Topdresser*

Mr. May's topdressing equipment for applying the liquid manure is quite simple. It con-

sists of a 400-gallon tank mounted on a motortruck and connected with a trough pierced with holes and attached to the back of the truck. The tap of the tank is simply turned on and the truck driven rapidly over the paddocks. Mr. May says this is not, of course, an ideal method, but it serves until he can secure a better appliance. It takes about three days to fill the cistern, which holds sufficient to cover approximately one acre. Eighty acres are topdressed thus each year. In the flush of the season the liquid is about half shed washings and half skim milk, but later in the season there is a larger proportion of washings. Mr. May has used whey instead of skim milk with good results, but observes that the skim milk is better.

### *Cows' Remarkable Improvement*

Speaking of the results of this manure, Mr. May said that before he used it his cows were roughcoated and obviously not in good health. He used to lose up to one-third of them in a year. They had abortion and mammitis, and many were sterile. In 1941 nine two-year heifers were in calf out of twenty-four. This year the whole herd of 125 cows and heifers went to the same bulls as before, and only one heifer and one old cow were empty. Of twenty-one two-year heifers, every one was in calf. The herd's production averaged 271 lbs. of butterfat per cow. They were Friesians.

Measuring the health of his herd also against the ill-health that is now so common in New Zealand dairy herds, Mr. May mentioned that according to official figures published in the press, mortality figures in one district showed that during the spring an average of 3,000 cows died per month, and in other places they were not much better. How much health could we expect to get from the butter and milk produced from such herds?

### *Plenty of Mushrooms*

Mr. May said that three days after he first used the milk-and-manure topdressing he noticed a change in the colour of the grass from a yellowish green to a healthy blue-green. When he first went on the farm there was hardly an earthworm to be seen, even after rain. Now there were thousands. There was now also a most prolific growth of mushrooms, whereas on neighbouring farms, where orthodox topdressing was done with superphosphate, mushrooms were extremely scarce.

Having found it impossible to get satisfactory help, Mr. May does the whole of the work of the farm with his own hands. He is a firm believer in humus fertilisation. He intends to apply a special Bio-Dynamic compost which he now has maturing.

# *Important Debate in the House of Lords (London)*

**Tuesday, Oct. 26th, 1943**

**Agriculture and Food Values**

LORD TEVIOT rose to call attention to food values in relation to agricultural methods in view of their importance to the health of man, animal and plant; and to move for Papers. The noble Lord said: My Lords, before I begin to deal with the Motion which stands on the Paper in my name, I wish to make a few general remarks. Your Lordships are well aware that the hospitals and similar institutions are full to overflowing, and this has been the case for many years; in fact, I do not think I am exaggerating when I say that all such organizations have a waiting list. How many of us are there who have not had some kind of operation, or have not been treated for some internal ailment? Only a few days ago I was talking to a friend who works among hospitals, and she was very perturbed at the enormous increase in the number of young people who have cancer. I remember that in my young days it was only old people who were thought to have cancer, but to-day such troubles seem to be on the increase. Then take the animals of our country. I do not think any of us who are connected in any way with agriculture can be other than perturbed at the number of diseases there are among our farm stocks. Take foot-and-mouth disease, Johne's disease, mastitis, abortion, swine fever and many others that one could mention. Lastly, I come to the crops. We are well aware that the diseases among our crops are legion. Yet it seems to me that we accept all these afflictions as part of our eixstence; and while immense sums are expended in trying to cure them, I am afraid there is no doubt whatever that disease is increasing.

Every day we hear a great deal about planning. The real object behind this Motion is to see that we put planning for the health of our people, the animals, the plants and the crops of our country, first. We know that the spirit of our people is magnificent, their courage, now as in the past, is undaunted. Their bodily conditions, however, are bad. I should like, if I may, to quote some figures. Since statistics are always boring, I will make them as short as possible. I have here a report—it is not marked "Secret," so I think I can mention it—from the British Medical Association, which sums up the whole situation in this way: While hundreds of millions are expended in trying to cure, only one-fifth of one per cent. of the natural expenditure and waste through ill-health is expended on research to find out, not how to cure but how to prevent. I have another authority here, from America. It appears that their position is very analogous to our own, but of course the figures are much larger because of the larger population. They put it in a rather realistic way. They say that every year among the population of the United States there are about 100,000,000 illnesses, serious or slight, and in the hospitals 700,000 beds are occupied every day in the year. The care of these patients requires the efforts of 145,000 doctors, 280,000 nurses or student-nurses, 60,000 dentists, and 150,000 pharmacists. It also necessitates 7,000 hospitals, 8,000 clinics, and 60,000 pharmacies. The public spend annually £143,000,000 on medicines, and medical care in all its forms costs about £700,000,000 per annum. Obviously, disease is a very heavy burden not only here but in the rest of the civilized world.

Now I come to my Motion. What is the cause of this terrible tragedy? From the evidence of very well-known authorities who have for years carried out extensive tests and experiments, the conclusion is that food is largely responsible. We hear a great deal about a balanced diet. With this naturally I am in entire agreement, but unless the components come from a healthy soil rich in humus, life-giving and disease-resisting properties must be deficient. This reminds me of a friend of mine who is a pharmacist, a man with whom I often talk on this subject. I asked him the other day, when I went into his shop, "Do you think that all of these tabloids that I see with their Vitamin A, Vitamin B, and so on, do any good?" He replied, "I sup-

pose they may, but I like to take my vitamins and my proteins with my knife, spoon, and fork." I thought that was a very good way of putting it. But he is not done with the question then if the food which he is going to eat with his knife, spoon and fork is not grown from healthy soil. We know what has happened in various countries with regard to the soil. I am sure that those of us who have studied the question and read the evidence of the great authorities on this subject who have made tests not only for one or two years, but in some cases for more than twenty years, must say to ourselves, "There is something wrong here with the soil." We are aware that the soil is our most precious asset and it has far too long been exploited for gain.

Throughout the world food has been sold a great deal too cheaply, and the soil, suffering from the strain upon it, has had to be boosted up with stimulants. We all know how long we should last if we boosted ourselves up with stimulants. Thereby the soil has been robbed of its fertility without anything being put back. Over vast areas in the United States and in Canada there has been erosion. We all know about that. Where there has been an attempt by artificial means to combat this, the result has been worse still. I do not want to become academic on this point, and I do not want to go on hammering away at things that your Lordships know about, but in order to develop what I am going to ask for at the end of my speech I must say a great many things that are home truths. It is obvious in this, as in everything else, that quality means a great deal, and if we can eat food that is of good quality, and if the protein of that food is of good quality, then we are healthy. Your Lordships know the name of McCarrison. He is a man with a world-wide reputation. Those of you who have read his works will know how he has studied other nations of the world, some of them quite small, who have none of these things, who have no disease except just the machine wearing out. The Hunzas in India are a particular instance. He writes that they have no abdominal troubles—no appendicitis, no colitis, no duodenal ulcers, no cancer, and colds are practically unknown. Then there is that great country from which I have just returned — China. The fertility of China has been maintained for thousands of years, and has supported hundreds of millions of people. One cannot but be impressed with the virility, the tremendous strength of the Chinese as carriers of immense weights, and by their endurance. I wish we had the same sort of thing here.

We all suffer from wrong nutrition on occasions, but even right nutrition and the proper diet must depend upon the component parts being grown in a healthy soil which will impart to the crops health and power to resist the disease that I have already shown your Lordships is prevalent all over the country. Surely crops doped with stimulants, dressings or sprays, cannot impart to those who partake of them resistance to disease if they have to be, if I may use the term, so much gingered up in order to exist. We know quite well that the soil which is impregnated in many cases with artificial means of keeping it going destroys the greatest friend of man in agriculture, and the greatest friend of mankind generally, and that is the earth worm. You put on some of these strong artificial manures and it means death to that worm straight away. So we have a sort of cycle—a healthy soil, a healthy plant, a healthy animal and then a healthy man, and it is the integrity of that life cycle which is so important. In fact so far as I can see it is the only hope, not only of this country, but of all the world in the future.

Many experiments and tests have been made with animals, and in particular with the white rat, by many men of great scientific knowledge and distinction, and it is curious that the white rat, which will thrive on good food as man will thrive on it, when it does not get it becomes unhappy, bad-tempered, neurotic. It has ill health, and becomes sterile; in fact the result of this bad feeding from soil which is not healthy reacts on the whole of its existence. We must in my view plan to put back into the soil those things we take from soil. I drove through Hyde Park this morning, and what did I see? I saw an immense pile of leaves being burned. That is wicked and it ought not to be allowed. I hope the day will come, and that ere long, when the people of our country will realize the importance of sustaining the health of our soil and with it the health of the people, because the two are indissoluble, the one needs the other. We all know quite well that we are prone to disease. That is a dreadful thought, but it is true and it is due to the defects and deficiencies in our diets which come through the defects and deficiencies of the soil.

I have just had sent to me this morning a short passage from a very distinguished man.

If your Lordships will permit me to read it, he says this:

"While recognizing the value of 'artificials' in crop production, the great reliance on artificial manures in common use insidiously impairs the health of the soil, predisposes to disease in the plants, with the resulting unfavourable influence on animal nutrition and the resistance of animals to disease, with in sequence a similar impairment in human nutrition and resistance."

What does medicine do about this? Medicine seems to me to be just a palliative. So far as I know, research is greatly concentrated on how to cure and not on how to prevent all this happening. There was suggested some time ago a Council of Nutrition. I hope it will be set up, and I am sincerely hoping, too, that such a Nutrition Council will take into very serious consideration, not what we shall all eat, but from whence it comes and how it is cultivated. If it does not, then in my view, and in the view of a great many others, it is just a waste of time.

I beg the Minister who is to reply to put forward to the Government a request that a Royal Commission or a Committee of Inquiry shall be set up to deal with these matters in order that we may somehow or other combat this really tragic state of affairs. I would respectfully suggest that the Ministry of Agriculture, and of course the Ministries of Health and Food, must be represented, and I would also very earnestly plead for the representation of many men who have been studying this subject for a good many years. I give as an instance Sir Robert McCarrison, Dr. Lionel Picton (of the County of Chester Local Medical and Panel Committee), Sir Albert Howard and also a Lady, Lady Eve Balfour, who has just written a most admirable book called *The Living Soil*. What I have been talking about is not happening here only; it is happening also in all parts of the world such as New Zealand, South Africa, the United States, India and Assam. These matters are occupying very serious attention and are being dealt with. In addition to those I have mentioned there are others with just as great positions in the experimental world, in the field, in clinics and in the laboratory. There is, moreover, a vast mass of ready-to-hand information that can be given by those who can speak with authority and give confidence to the public mind on the subject. I should say that with the information I have and that many others have on this subject a definite decision could be arrived at pretty soon. Then we could proceed to tackle this question which I think is vital not only to the future health of the people of our country but to the future health of all the people in the world. I beg to move.

THE EARL OF PORTSMOUTH: My Lords, at the beginning of his speech the noble Lord told us that planning should begin with the soil. In that I most heartily concur. It seems to me that with all our planning for the post-war world at the moment we are in danger of getting everything arranged inside the cart but of forgetting the position of the horse. Housing, medical services, all the other amenities are the cart and its furniture, but food is the horse which alone can draw the cart, and the vigour with which the horse can perform his duties is the sole test. I give that as an illustration of how necessary it is to have regard to food as the first item in planning for health. I would recall to your Lordships the report of Dr. McGonigle, that it was found when a great city set out to rehouse slum dwellers the result was a vast increase in the birth-rate and more disease, because people had less food in their new houses than they had in the old. That the quality of food matters is shown in the experiment of a very well-known doctor, Sir Robert McCarrison who in a pioneer health centre found that when expectant mothers were examined, the hoemoglobin content in the blood was far too low. He found it impossible, with all the modern assistance of injections and so forth, to raise that content until the mothers had drunk raw fresh, unpasteurized milk. Nothing else would do.

Sir Robert McCarrison experiments on rats, or some of them at least, if they do not prove at any rate very strongly suggest that the life and health of the rat under ideal conditions was more dependant upon the way the food was produced than upon the food itself. From that I think it might be safe to deduce that positive health, such as the noble Lord, Lord Geddes, mentioned in a recent speech—one of the most remarkable speeches, if I may say so, that I have seen reported in your Lordships' House for many years—vigorous abounding health, normal health, and not merely the average freedom from disease, can come only from proper treatment of the soil in the beginning although it may be that other things have also something to do with the matter. In our own country before this war the

cost to the State of health—that does not include private patients of doctors or the people who put sixpence in the slot in the "pub" and get an aspirin tablet—was more than the total wholesale value of our home-produced foodstuffs, considerably more. If, therefore, there is complaint from time to time, when care is taken to prepare good food, that the cost of it is high, I would like to reply that the high cost of ill-health equals the low cost of food, and the low cost of food, as my noble friend has just said, equals exploitation of the soil.

There is no time in this debate to recall to your Lordships all the evidence of very serious indications of the gravest nature that our treatment of the soil is leading to all-health and disease in plant, animal and the human being. The noble Lord, Lord Teviot, mentioned that very remarkable book by Lady E. B. Balfour, *The Living Soil*. In that book there is given for the first time, at any rate in our country, the evidence of the indications which go cumulatively to prove that something is very wrong with our present methods. There is no time now to do more than try to draw an analogy. The analogy which I would like to draw is again from the human body. Very few surgeons today would care to perform a surgical operation with crude antiseptics, and very few doctors would advise their patients continuously to use strong antiseptic nasal sprays. If they did the living membranes would suffer and would have left no power of resistance to disease. But we are doing exactly that to the soil. With lethal sprays we are destroying the soil's power of resistance and we are at the same time giving continuous doses of chemical food and chemical stimulants so that the infinite complex of bacterial and mycelial life in the soil is being upset, and we are upsetting the vitamins content, that is the capacity of the soil to produce food by destroying the humus within the soil itself. I wonder sometimes whether not only the sub-normal health from which the majority of our population suffers, and indeed the population in all the so-called civilized world, but even the birth-rate are not closely connected with this exploitation of the soil which has been going on so long.

If your Lordships will excuse me I would like to relate my own personal experience because I feel it is relevant to the argument. When I started to farm some twenty years ago I was thoroughly up to date with modern ideas, but gradually by trial and error—far more often, I may say, by error than by success—I revised all my previous notions. I found again and again that, despite what analysis proved, the quality of bought food was very low compared with the very genuine food value in my own home-grown foodstuffs. For instance, in a comparison between protein in beans and in oil-cakes, my beans won every time. The same thing was found in home-grown oats. The old analysis showed their food value to be very low, yet practical experience in feeding home-grown oats to my own cattle showed the value of the oats to be much higher than anything that could be bought, except the most expensive foods. I found that my animals had a bloom. That experience brought me back to the necessity of consulting nature instead of trying to beat her. I have come, therefore, through the very hard force of circumstance and by practical trial on my own land, to believe that there is more in the way we treat the soil than there is in any methods of trying to get the maximum out of the soil by artificial means.

Though I admit that my own farming experience is very small—I feel that I would have to live for five generations before I could speak with any authority—if I could farm exactly as I liked without any restrictions at all for a few years and treat my soil exactly as I liked, I would be willing to introduce any ordinary disease in plants, and I would be fairly certain that, though the disease would be there, it would not have such a hold as to matter. I would also be perfectly willing for all those who worked and lived with me on that land, and fed from those products likewise, to face any epidemics that might occur with far greater hope of success in overcoming them than would be the case otherwise. Lord Geddes, in that speech of his which I mentioned earlier, spoke of the need for integrated research, of the need for getting rid of the fragmentary attitude and bringing the fragments together into a mosaic that might make a whole picture of life. But if there is only a shadow of suspicion that for us and our population in this country, and indeed for all people in the modern world health depends on the right treatment of the soil, then I would suggest to your Lordships that there is no time for delay. Though very little may have been proven positively, if there are sufficient indications that there is more than a shadow of suspicion that our methods are wrong, we cannot afford to wait. We have

had 150 years of harm through the workings of the industrial revolution. We have had 100 years, nearly, of exploitation of the soil. The human body is very slow acting. It will stand up to almost anything under almost all conditions, and the sooner we know positively what is right in this connexion the sooner shall we be able to take steps for improving the health of our people in the future.

Lord Teviot, at the end of his speech, urged upon His Majesty's Government the setting up of a Royal Commission. I would like to support that, and to express the hope that it would be a permanent Commission, not one that would dissolve after its first findings. Such a Commission might become the basis for continuous integrated research and the development of knowledge. But that will take long. The authors of *Biologists in search of material* stress that it is almost impossible, in this country, to find a human being who may be described as normal, that is an individual of abounding physical health and with the fire of that h e a l t h glowing and radiating from him. The great majority of our people are only sub-normal, although they may have nothing positively wrong with them. There is no normal standard of positive health in this country by which to measure the real health, the positive health, of the population. This will mean that a Royal Commission will have to perform years of work under most difficult conditions, collating evidence, and perhaps carrying out certain inquiries in the outer countries of the world where there are pockets where the health of the people and health of the soil show up abundantly together.

So I would like to urge on the noble Duke, who I understand is going to reply for the Government, that he should ask the Government to consider the immediate need for the initiation at home, as soon as possible, of a large-scale comprehensive experiment. The experiment I suggest should be performed on a large block of land and the soil there should be treated according to different methods. But the experiment should not be concerned only with the soil. From that there should be built up integrated research concerned with all types of plant and animal life and human beings as a community. The control will be the rest of the nation. Such an experiment, I suggest, would have to cover twenty years at least. It seems to my mind that we might derive from it very strong indications within a few years, but before definite proof which might sway the nation could be obtained, I think twenty years must elapse. And there is no time to be wasted, for whenever there is a genuine advance in these matters those interests which consciously or unconsciously are vested in ill-health make their influence felt, and they will not be easily overcome. Undoubtedly there will be a great deal of combat. Much of it will be carried on by both sides in good faith, but undoubtedly the necessity for combat there will be.

Therefore I would like to conclude with a remarkable document from the Cheshire Panel Doctors Medical Testament. They say:

"That the use of the wastes of life in accordance with natural laws is at the root of national health, seems to us to issue from a contemplation of the whole subject. Even when wastes are returned to the land merely to get rid of them, they assert their power of conferring fertility. . . . It would seem that the marriage of agriculture to a foreign partner, chemistry, arranged by Baron Liebig in 1840, was a mistake. A more homely alliance would have been preferable—in our Cheshire proverb, 'It is better to marry over the mixen than over the moor.'"

Lord GEDDES: My Lords, I feel sure that I voice the feeling of every one of your Lordships when I congratulate the noble Lord who has just spoken on the speech which he has delivered. It is the first time that he has addressed your Lordships' House and I feel certain that every one of us present hopes that it will not be the last. The noble Lord who introduced this debate to-day has put forward a case for health based upon the working idea of soil health, which, in turn, he suggests, means plant and animal health. That plant and animal health, he says further, results in human health. There is a great deal of truth in that, of course, but I do not know that it is all quite as simple as that. For many years I have been concerned with the problem of what is, and what is not, the cause of positive physical health. It is a very elusive and very difficult problem, but I recall to-day that thirty years ago—it was in October, 1913—I was talking to a very distinguished man, whom many of your Lordships will remember and one of your Lordships especially, Sir Andrew Macphail. He said to me: "There is only one place in the world that I know of where positive

health exists—Prince Edward Island." That idea has remained at the back of my mind for many years. I would remark that Sir Andrew was a Prince Edward islander. I understand that there is at least one of our Lordships who believes that New Brunswick is also the seat of positive health!

At all events, Prince Edward Island has recently been the subject of a most interesting demographic investigation. That very distinguished lady—the most distinguished of our British demographers, in my judgment—Dr. Enid Charles, has published the results of her examination into the demographic statistics and position of Prince Edward Island. It is relatively a small community, one of the provinces of Canada, peopled almost entirely by descendants of Western European stocks; the Scots form 44 per cent., the English about 21 per cent., and the Irish and French make up the rest. There we have a very high standard of health, an extraordinarily vigorous, active population, and, quite remarkably after fifty years of close examination, no fall whatever in the birth-rate. It is the only social organization composed of Western Europeans which has not shown in the last fifty years a really sharp fall in the birth-rate.

It is important to examine, therefore, what special conditions attach to life in Prince Edward Island, to see whether there is any evidence which would support, at least in part, the view put forward by the noble Lord who moved this Motion. Prince Edward Island is surrounded by the waters of the Gulf of St. Lawrence. The population is engaged in fishing, farming and the rural trades and crafts. There are no great cities. The farming there is mixed, not like the farming in the prairie provinces of Canada. It is mixed farming, and it has always been carried out in the traditional manner, not using large quantities of artificial fertilizers but using muck and the products of the sea. There we have this Scotto-Anglo-Erse-French population maintaining a standard of health, a standard of well-being and a standard of reproduction which is unique amongst Western Europeans at the present time. That is not a chance impression; it is not merely the feeling that one might have about Prince Edward Island; it is the result of one of the most beautiful pieces of demographic research that can be found anywhere. I suggest that any of your Lordships who are interested in this subject s h o u l d look up Dr. Charles's paper on this matter, which will be found in the Canadian *Journal of Economics and Political Science*, Vol. 8, 1942.

There is one point which is of such very great interest and importance that I am surprised that it has not been widely noticed. The population reproduction curves for these fifty years, when the cubic parameter is applied, shows that there is running through that curve a 44-year cycle, and, by going back before the fifty-year period and getting the best figures available, there is a carrying of that curve backwards. The interesting point is that not only is there that cycle there but that, from the interpretation of the Fourrier series, we find a 9-year subcycle working on the 44-year big cycle. These cycles have been met before in connexion with vegetation, and they affect health. They appear in Prince Edward Island, where very level positions have been maintained in health and in the reproduction rate. That is most suggestive from the point of view of the subject which I ventured to bring before your Lordships some time ago—namely, the physiological element in the fall of the birth-rate, which I spoke of on that occasion as being referred to the germplasm, as it undoubtedly is. We have got, therefore, in Prince Edward Island, a population living very much as the noble Lord, Lord Teviot, has suggested we all should live, drawing their food fresh from the sea and from the field in the traditional manner, living upon simple foodstuffs, the products of their own farms and fishing, and maintaining an extraordinarily good state of health and birth rate.

Another paper by Dr Enid Charles, who is now in the employ of the Canadian Government—I feel sure that the Government of Canada should be congratulated on the steps which they are taking to work these matters out—has appeared in the *Journal of Economics and Political Science*, of May of this year, on the differential birth-rate in Canada, and it shows something which I think is of extraordinary interest. The French people in New Brunswick, Nova Scotia, Prince Edward Island and Quebec have a very high birth-rate. They live in a traditional way in all those provinces. If, however, the French Canadians move to the wheat farms of the prairie provinces, their health declines and their birth-rate falls in some cases below the level of British stocks. That is a very interesting observation proved by the most careful

statistical examination of all the available facts in the possession of the Government of Canada.

What has happened? Those people have moved away from their traditional life and their traditional type of agriculture and from their traditional association with the sea to a continental climate and to wheat farms where a large part of their food is similar, being imported, to the food in the towns and cities, and therefore their birth-rate falls abruptly and their health declines abruptly. These are matters of very great interest and very great importance and, so far as I know, this work of Dr. Enid Charles has not received anything like the attention which I feel sure it deserves, because she has behind her the full resources of all the knowledge possessed by the Government of Canada, and she, as one of our leading demographic experts, has been working out these facts.

So far as we have gone, it looks as if the case put forward by the noble Lord, Lord Teviot, was supported one hundred per cent. by these Canadian figures. We see the good health, the high birth-rate with the type of agriculture he recommends, the association with the sea which he recommends; we see the birth-rate of these French-speaking people fall almost like a stone as you go away from those conditions. The case is complete. It is a most extraordinary thing that as soon as you get to a people of different stock origin, the Central Europeans, that is to say, the Eastern Germans, the Czechs, the Poles and the Rumanians—as soon as you get to the stock of Canada derived from those countries you find that the birth-rate r i s e s as they go West; it is low in the East and high in the centre; and their health goes up, too, as far as I can make out the figures. And what clearly suggests itself to my mind as the line along which one has to look for an explanation would be that they are racially adapted to a continental climate, whereas the Western European is racially adapted to a maritime climate, and that we have thus got another factor coming into health.

Again I refer to Dr. Enid Charles and her work. She has been struck as the work has gone forward by the extraordinary difficulty of assigning any one influence in the observed facts as a cause, and she has worked out the correlations between health and reproduction and the various things which are known to affect them. For instance, taking reproduction for a moment as one of the indices of positive health, you find that always with rise of income there is a fall in reproduction; you find always with urbanization there is a fall in reproduction; and you find always that if a large number of women are employed in any occupation, that becomes a low reproductive occupation. And there are some other facts, such as the association of low fertility with textile workers, which has been known since before the Christian eras. If you take all this and work out the correlation of health and reproduction, which Dr. Charles does, you will find that only something between one-third and two-fifths of the variations in this manifestation of positive health can be accounted for by the environmental conditions, and that the rest, the two-thirds or three-fifths that is left, are not explained unless they have an association with the nutritional type with which the individual is by descent associated, and with the climate type with which again he is by descent associated. So that we have got a highly complex picture before us, and we find in it one of the factors, and a very important factor—this question of the origin of the food. But how far food, and food alone, is responsible for the ill-health of this or that population it is not possible to say definitely without complete demographic examination, and also external experimentation.

Now I have another group of facts which I should like to bring before your Lordships, and they refer to a completely different part of the world. In 1924 or 1925, when I returned from being on duty in the United States of America for four years, I was asked by the then Prime Minister, Mr. Baldwin as he then was, to see what I could do in connexion with the supply of copper for this country. It seems to be a far cry from soil health to copper, but as a matter of fact the nation would not be getting its copper to-day unless somewhere in the back of my mind had not been the fact that soil health was what made health. Because the copper that we had to get hold of was in Northern Rhodesia. It was the only place in the sterling area where there were known deposits of copper. It was not very well known, but copper was known to be there because it appeared in native use, and we had to get a copper reserve in order that we might in this country be in a position to defend ourselves, because copper is extraordinarily important in connexion with war preparations. The country in which that copper existed was in large parts de-

populated. There was no one living there, not even Africans, because of sleeping sickness, malaria and all the range of tropical diseases which make some of the great forest areas in the heart of the tropics impossible for human life. We started in, and the greatest medical problem that I have ever known was the opening up of the Copper Belt in Northern Rhodesia—probably the greatest medical problem of our time.

There are several branches of medicine. There is curative medicine, which divides itself into research into the nature of diseases, and the other part of curative medicine, the care of sick people; there is preventive medicine, which deals with all the problems of keeping a great community healthy; there is tropical medicine, which is really a spawn of zoology—it is rather making a study of the wild animals that live in the country, even though they are small. And then there is creative medicine, and creative medicine is a thing that very few people know anything about at all. In going into Northern Rhodesia we had to use all the forms of medicine in order that we could get in. A country that has been depopulated by the virulence of the diseases there is not an easy country to get people of another race into and to keep them in a good state of health. I shall not bore your Lordships with the various steps taken during the fifteen years that followed, but I will tell you this. The curative medicine was just the ordinary sort of curative medicine of Harley Street or elsewhere. It was interesting, but of very much less interest than the other. Preventive medicine dealt with the ordinary problems of public health in a community. As to tropical medicine, the School of Tropical Diseases helped us and we found out a lot of things ourselves. Creative medicine—what did we base that on? On the health of the food; and my noble friend Lord Bledisloe can tell you that our idea of how to keep people healthy there is that we give them food grown on rich humus soil with plenty of life in it.

What have we done? What have the men who were there done? I do not want to take any credit for myself—I was only Chairman of the Company. The people who fought the thing through were the doctors and the agriculturists on the spot—everybody there. My job was simply to see that they were not interfered with by short-sighted economy. They have beaten back disease, and turned that part of Northern Rhodesia into what is a health resort. It is a most extraordinary phenomenon. The positive health of these people is based on food. This group of facts provide evidence tending in a definite direction. They show the importance of what Lord Teviot has brought before your Lordships, and they show it in a way, I believe, that places the truth of his contention on a secure basis—that food is the basis of health, but it is not the only basis. There are a great many other things that have to come in. May I mention one thing more?

NOBLE LORDS: Go on.

LORD GEDDES: I do not know whether many of you are familiar with the Hawthorn experiments carried out by Harvard University, with Dr. Roethlisberger as chief examiner. They were carried out under the direction of Harvard at the Western Electric Works at Hawthorn. They were directed towards discovering how to get the greatest efficiency out of the workers, and they began, like all these management investigations, with a sort of gadget-loving lot of pseudo-scientists on the job. It always happens like this; they always turn up first! These experiments went on for ten solid years. They started off—it has nothing to do with health for the moment but that comes in later—with an attempt to get the greatest efficiency out of the girls working in the factory where the electric relays were made. In the best style they fixed one shop as control, another shop as experiment, and they began jigging around the benches. Output went up. They increased the light, and output went up. They increased the light a bit more, and output went up—it went up in both shops!

Then they started the bright idea—quite unusual in industrial psychology—of reducing the light. So they reduced the light—and output went up! A variety of other performances were gone through and, finally, what it came to was this, that the people working in the Hawthorn factory worked well when they felt important and when they felt they were being appreciated; that made them happy. In other words, the human value of the people was what mattered. After many years the whole thing is worth reading, and perhaps the most reverend Primate (the Archbishop of Canterbury) might find a great deal of interest in it. It is all in Roethlisberger's book *Management and the Worker,* which goes tremend-

ously into the social application of the matter. The book is published by the Harvard University Press, and there is quite a good summary, a short view, of it in the May number of the Canadian journal of which I spoke a moment ago by Hart of Toronto University.

What we have found also in Northern Rhodesia and what appears to be the case in Prince Edward Island is this, that the really surprising health which you find in these places, considering the c o n d i t i o n s in which the people are living, is linked with a feeling of importance and of being cared for, and in connexion with positive health there is no doubt that that has an enormous psychological value. That is the last point I want to make, but before I sit down I would support the plea put forward by Lord Teviot for some sort of work to be done in this country to follow up the w o r k which is being done now in Canada. Canada is a peculiarly suitable place for it, because there you have got a new country, and practically in a n y given year you can have a cross-section of the population. You have the old French settlement in the East, the old Highland settlement, and the more recent settlements, all with their different traditions and different culture habits. If we had in this country an examination going forward comparable in its vigour, in the clearness of direction, and in its intelligent purpose to try to discover really what the people are doing, how they are, and how they are prospering, I believe we might be able to find surer ground for many of the necessary social improvements than we shall find if we allow ourselves to be directed, as we are too often at the present time, by pseudo-scientists—men who know far too much about too little, and very soon will know far too much about nothing at all—and too much multiplied by nothing is still nothing!

VISCOUNT BLEDISLOE: My Lords, it is seldom that your Lordships enjoy the delight of listening to such an informative and indeed erudite debate as that initiated by my noble friend Lord Teviot. I think your Lordships will feel that this step in the part of Lord Teviot has been fully justified if only by the interesting and well informed speech which fell from the noble Earl, Lord Portsmouth, and the illuminating discourse to which we have just listened from Lord Geddes. Lord Geddes, if I may say so, is an unduly modest man. But for him I dread to think where we should be in the matter of copper supply for essential war requirements to-day. He has pointed out very interestingly that the October output from the Copper Belt of Lower Rhodesia is very largely due to the efficiency of the workers in at least the British controlled portion of the Copper Belt and, if I may say so, most emphatically to that mining company over which he himself so skilfully presides.

He has pointed out that in South Central Africa the land is fearfully poor, and is on the whole badly farmed, that there is very little mixed husbandry, and that the morbid condition of the native population is appallingly high. Indeed when I was out there five years ago as Chairman of a Royal Commission I found that the chief problems that we shall have sooner or later to solve in that area depend not merely preponderantly upon the health of the native population, and especially upon the native workers having a properly balanced ration, but also upon the distressing fact that over 60 per cent. of the millions of natives living and working in that part of the world are affected with some disease, a very great proportion from venereal disease, but a large number of others from various sub-tropical diseases, all of them induced or aggravated by malnutrition on the part of the native population. The noble Lord was modest in this respect; he did not tell the whole story. When I visited that remarkable oasis in the desert, where everything seems to be bright and green and the bulk at least of the white population happy, cheerful and well supplied with every sort of social amenity, I discovered that the efficiency of the natives working in these copper mines was largely due to the fact that my noble friend Lord Geddes had made experiments through his management with the men, I believe not swayed solely by philanthropic motives but by economic considerations, to discover what a properly balanced ration for the native race is.

Perhaps Lord Geddes will forgive me referring to those experiments because they are very remarkable. They showed, if I remember rightly, that if, instead of feeding the natives entirely upon the starchy food which is what the country—most of it rather a poor type of land—preponderantly produces, you introduce a meat ration once a week and couple with it, I think I am right in saying, vitamin C in the form of citrous fruit, there is a remarkable increase of output on the part of the native work-

er, amounting, I believe, to something like 30 or 40 per cent. If the native is given two rations of meat a week (very unusual) that efficiency and quantity of output is augmented by a further 30 or 40 per cent., but if you give him three rations of meat a week the law of diminishing returns begins to operate and it is found not to be strictly an economic proposition. All that is new knowledge, very valuable new knowledge which, so far as I know, but for the enterprise and scientific activities of my noble friend and his managerial staff would not be available to-day.

My noble friend Lord Teviot appears to desire to see some action taken in order more definitely to establish the interrelation between morbid or deficiency conditions of soil, edible plants, animals and human beings, and he has cited very interestingly the experiments and observations of General Sir Robert McCarrison, Dr. Picton, at the head of the approved panel doctors in Cheshire, Sir Albert Howard, of Indore fame, the famous discoverer and promoter of the Indore method of making compost which I am glad to say is now being largely taken in hand in South Central Africa to the marked and obvious advantage not only of plant products but of the animals and natives in the areas where it is employed. Last but by no means least there is that enterprising lady, Lady Eve Balfour, who has just produced a remarkably interesting little book to which Lord Teviot has referred. I am bound to say that there has come to my notice, particularly in New Zealand, evidence apparent to the least instructive. I thought there was a very remarked relationship between these three different factors. There is of course an immense amount of strong conjecture but, so far as I can discover, very little ascertained knowledge. I myself only about eight months ago, when I was perhaps rather imprudently commenting, in a preface I wrote for a certain interesting book upon war-time agriculture, upon the value of the use of compost in the absence of an adequate amount of farmyard manure, drew attention to the conclusions of my noble friend Sir Albert Howard and I was taken to task by the late Sir Daniel Hall, who, I suppose, I may say was for ten years prior to his lamented death, a few years ago, the outstanding agricultural scientist in this country. What he said was this: "Be cautious in what you are saying, at least in print, because although there is every likelihood that these conclusions will ultimately be proved to be true, there has so far been no full development of research to establish them beyond all doubt."

Therefore I want to press very strongly upon His Majesty's Government that the time has come when there ought to be research—research not merely conducted in watertight compartments affecting on the one hand the health of plants, on the other the health of animals, and in the third place the health of human beings and some relation between the soil and all of them, but comparative research on the important problem of the interrelation between the morbid conditions of soil, plant, animal and human being. For many years past in the field of comparative pathology we have moved very slowly behind certain other countries, notably Denmark and the United States. What applies to comparative pathology—in which respect Britain has frequently been severely criticized by scientists overseas—applies just as much to other branches of science affecting the different habitat in which these morbid conditions exist.

The noble Lord opposite, in a debate not long ago initiated by my noble friend opposite—whom we are all glad to see back after his serious illness—referred to undulant fever. Undulant fever, as most of your Lordships know, is due to the ingestion of the milk of animals suffering from contagious abortion. What did our doctors know about this up to about fifteen or twenty years ago? Most of them do not know much about it to-day. A case in my own neighbourhood was mismanaged, for at least six weeks, because that disease, traceable to the morbid condition of a cow and her milk, could not be diagnosed. That is only one illustration. We are still in a considerable condition of doubt and mystery with regard to foot-and-mouth disease and to distemper in dogs, which is supposed to be closely associated. All these diseases, which I believe are due to ultra-microscopic filterable viruses, are suspected of causing a good many serious diseases in human diseases, but the interrelationship is not fully established.

Would your Lordships allow me to refer for one moment to New Zealand? New Zealand is conspicuous among the countries of the world in which soil deficiencies exist and it has been perfectly well known for at least a generation that the soil deficiencies result in very serious diseases in live stock.

Bush sickness, for instance, which devastated so far as live stock are concerned the most fertile part of the North Island about thirty years ago, was found to be due to the lack of an almost infinitesimal amount of iron and cobalt—cobalt which the noble Lord is producing in the Copper Belt of Northern Rhodesia as a by-product of copper production and which has proved of enormous value in New Zealand. Dopiness in sheep, which also affected many parts of New Zealand, is due to lack of lime; goitre in sheep, and in fish for a certain way up the river from the sea, is traceable, as your Lordships know, to lack of iodine; and other diseases are traceable to lack of phosphate. Owing to research on this subject—and very valuable research is being done to-day by scientists in New Zealand—all these diseases are being counteracted by the supply of something which will make good those deficiencies. But what the doctors do not know is the relation, if any, between these deficiencies and several mysterious morbid conditions of the human population of that very loyal Dominion. When I was His Majesty's representative in that country I did my best to see that research was instituted into that subject. Everywhere doctors are very anxious that something of the sort should be initiated, and if we here in the old country can do anything in that direction no people will be more grateful than the inhabitants of New Zealand.

I want to give an illustration of the difficulties under which we are labouring to-day. A few days ago I raised in your Lordships' House the question whether the Government could see their way to remove the restrictions upon the use of phosphatic fertilizers on unploughable grassland. They did not see their way to do it. I emphasized the fact that large quantities of phosphatic rock are lying on the shores of Tunisia to-day waiting only for vessels to ship them for conversion into superphosphate of lime for use in this and other European countries. I hope that before long the embargo upon the shipment of the source of this phosphatic fertilizer will be lifted. I emphasized also on that occasion, by the way, the fact that these unploughable pastures are becoming notably deficient in phosphates is indicated by the sort of weeds, which are perfectly well known to the scientists, which spring up in these old pastures. They are of no nutritive value to the stock and of course gradually spoil the pasture.

I took some trouble after the debate to consult some agricultural scientists and certain Fellows of the Royal Society as to whether, if cows are raised upon pastures deficient in phosphate, that deficiency is transmitted to the milk, and if so what effect it has upon human beings. I am sorry to have to tell your Lordships that there is no knowledge in this country on that subject to-day. I was told that there was good reason to believe that a cow, before she starves her milk of the normal amount of phosphate content, is prepared to starve her own bone structure, her muscles and therefore her constitution, to the detriment not only of her own health but to the detriment, of course, of her offspring. But there is no exact proof to-day of what is the result of feeding cattle upon phosphate-starved pastures.

Another problem came to me from New Zealand, where there has been a certain amount of ergot infestation in rye grasses. We know it chiefly in rye in this country and Europe generally, but in rye grasses here it is relatively uncommon. There is a considerable amount of ergot disease in rye grasses in New Zealand to-day, and of course as your Lordships know a very large proportion of our rye grass seed for sowing our own pastures comes from New Zealand. The problem put to me by a certain group of scientific women in New Zealand was this: "Can you ascertain in the Old Country whether the consumption of milk from cattle that has been fed upon ergotted rye grass will produce abortion in human females? We have some reason for believing it will." Surely that is a problem we ought to be able to solve, a problem of the very first importance. There is no exact ascertained knowledge on that subject to-day in this country or, as far as I can ascertain, in the world. It is assumed, because, where abortion has taken place in women no ill effects can be traced with exactitude to this consumption of ergotted rye grass by cows that have supplied them with milk, that there is no real reason for any great alarm on this subject.

I only mention these things to show what an enormous volume of important research work has yet to be done, and to be done particularly at a time when we know that we are exhausting the land of this country in order to feed our population and our fighters overseas adequately during this war. After the war we shall be faced with an almost abnormal exhaustion of the soil, and if that exhaustion results in a lack

in the soil of ingredients essential to human health then surely it is up to us, to get at the truth. It seems to me that that can only be done by research of the character which I have described.

THE EARL of WARWICK: My Lords, I have always understood that in considering the subject which has been brought to the notice of your Lordships by Lord Teviot to-day, it is necessary to approach it with a considerable degree of humility. That is on account of the difficulties of the subject. Now I feel doubly humble owing to the really remarkable standard of the speeches which have already been delivered in your Lordships' House to-day. I always greatly enjoy listening to the speeches of the noble Lord, Lord Geddes, but of course he made the subject into a world-embracing one, if he will allow me to say so. For those more simple individuals amongst us who have not his knowledge, I would like to try to confine my remarks to that part of the subject which relates to our own island. Lord Geddes referred to Prince Edward Island, concerning which I have previously had the pleasure of having some conversation with him. The reason why that particular geographical entity may fitly be made use of in this connexion is that it very closely reproduces our own climatic conditions. In addition, it is, of course, principally stocked by people from these islands.

Now before going into details I would like particularly to stress that word "humility," because while your Lordships' House is a most enlightened place, the attitude of the general public to this particular subject is really staggering. The ordinary man in the street seems to believe that he can go on year after year; that he belongs to a particular civilization unlike any of those which have preceded it, a civilization which nothing can stop and which, apparently, is going eventually to reach Utopia. That may be possible, but I think your Lordships will agree that it is also, possibly, unlikely. In any case the enormous industrialization that has taken place in our world, in what is really a minute of time, has created huge sections of the population who are totally ignorant of the soil from which we are sprung, and unless they are taught to know and understand it and to love and cherish it, then, to my mind, there is no question but that the fate of our civilization will be exactly the same as that which befell Babylon, Egypt and Rome.

We must possess self-knowledge and we must practice a humble and really statesman-like method of approach to this subject if we are to get anywhere. It is no use continuing with these charming theories and political devices which are to-day perplexing the world with ideas for our post-war fashion of living. Man is made up of two things—his body and his soul which comes from God. It therefore follows that unless he can do away with nature, unless he can invent some methods of maintaining and reproducing life without recourse to nature, then surely he must try to marry the laws of God and the laws of nature instead of perpetually trying, as he does to-day, to keep them at variance. Scientific knowledge, as was pointed out by Lord Geddes, may be a very dangerous thing. I am afraid that our generation has been inclined to lack the wisdom necessary to apply scientific knowledge. I read a paragraph in a newspaper the other day which recorded the declaration of a scientist that summer milk dried by a certain chemical process was quite as good as winter milk taken directly from the cow. That is really a half truth. What the scientist really meant was that with the limited information available to modern bio-chemists, and according to a toy scale of measurements which these chemists employ, the constituents of these two milks of which he spoke, when compared, appeared to be equal. Now it is a very funny thing that the general public are more impressed by that sort of scientific remark than by almost anything else. Whether it is because they are frightened by the long and high sounding terms used by the scientists, or whether it is because they do not live long enough to hear the scientists of the next generation refute the theories of the scientists of their own generation, I do not know.

May I recall to your Lordships some simple doggerels in this connexion. The first one, which is by Pope, runs:

"Nature and nature's laws lay hid in night
God said: 'Let Newton be!' and all was light."

About 300 years later another poet—in this case I believe Sir John Squire—wrote:

"It could not last; the devil shouting 'Ho!
Let Einstein be,' restored the *status quo*."

Now, if the experiments of this worthy man of science had been carried out, and the results had been satisfactory to his theory and his idea of the synthetic improvization of nature, can anybody prove that

in the next generation or in the generation after that, or in the third or fourth generations, evil results might not appear which would mean death to the race? We have astonishing belief in our little test-tube marvels and in our ability to mould ourselves in what we appear to think is the image of God, and it is frightening to me to think that 99 per cent. of the so-called civilized population of this world are more likely to pay attention to a newspaper article of this nature than to use common sense and humility, and to realize the almost certain improbability of our poor little civilization having been chosen as the one to upset the whole cosmic world.

Scientific proof rests upon a series of experiments prolonged into infinity. There is really no such thing as scientific proof; there is only scientific probability. In dealing with all these subjects which concern dietetics for men, beast and soil, any experiment must perforce take a long time, and, because we are concerned principally with the human body, any experiment will be very difficult to do. The noble Viscount, Lord Bledisloe, discussed the passing of phosphates through milk into the human body. Apart from our old friend the white rat, it is very difficult to do experiments except with the human body, which is apt to object to being treated in that way, so that our knowledge must perforce come slowly. I think, however, that if we take the whole cycle of nature, and then add those man-made discoveries which are most probably proven, always remembering their possible fallibility, we have a reasonable chance of continuing to exist, together with all those other organic bodies that are in the world; but, if we do not, I am sure—and I know that many of your Lordships are of the same opinion—that we are committing ourselves to a form of race suicide.

We all know the history of agricultural England, from the days of the Saxons and the Normans up through the village lands to the enclosures of the eighteenth century and the perfection of the rotation of crops introduced by Coke and Townsend. I suppose that that system exists to-day almost in the same form as it existed a hundred and fifty years ago, with the exception that probably since 1846 and the repeal of the Corn Laws it has not always been permitted to be properly carried out. I do not suppose that any really serious effects on our soil, although they existed, became noticeable until the twentieth century; but with the enormous strain which we have put on our soil in the last war, and to an even greater extent in this war, those effects are becoming very apparent. I am certain that at the end of this war the soil of this country will not resemble at all the soil of the country in the time of our Saxon forbears. That soil was an accumulation of the composting of thousands of years. It was rich in fibre, in lime, in nitrogen, and above all in vegetable humus. I do not suppose that the Englishman has ever put back into the soil as much as he took out. If, like the Chinese, he were to do so, I do not believe there is any reason why we should not continue to grow the straw crops which we have grown in the present war for an almost indefinite period. However, this is not and has not been the case, and we are faced to-day with the possibility of those difficulties which have so seriously affected the United States of America with their "dust-bowls." The very short history of that country should enable us to realize the enormous speed with which such a catastrophe can occur once it has started.

I should like to quote a few small cases which fall into line with the speech of my noble friend Lord Portsmouth. I recall a remark by Sir Albert Howard to the effect that he had noticed that over a period of twenty years or so stock grown upon soil rich in humus seemed to him to be immune to diseases such as septicæmia and foot-and-mouth disease, which frequently devastated the cattle in his area. Some years ago, in South Lincolnshire, I came into contact with a farm which was in an almost derelict condition. Quite a good farmer took it over, and the first thing he had to do to restore its fertility, of course, was to stock it heavily. This he did, with, I am glad to say, ultimately excellent results; but it is very significant that although he was a good farmer and had good stock, within the first two years of his occupation of that derelict farm his farm was the first to have a recorded case of foot-and-mouth disease in that county.

Ask the dairy farmers to-day what is their principal difficulty, and I think they will answer that it is the sterility of their cows. They try to get their cows in calf in the autumn and winter months, in order to produce winter milk, but in nine cases out of ten the cow will not calve until the following spring. What is the cause of this? Partly, of course, it is climatic, seasonal, but to a very

large extent it is due to the devitalized condition of the food on which the animals are fed during the winter months, and the reason for this is that it has been produced on devitalized soil, which has been treated only with artificial fertilizers. Sir Robert McCarrison, who has been referred to several times to-day, made a remark about thatch straw which has always fascinated me. He said he had seen on many occasions that straw grown on soil rich in humus lasted ten years or longer in the thatch, but if grown on a similar soil which had been treated only with artificials it was rotten at the end of five years. We have heard all about the white rats, and how they can exist on potted vitamins but cannot breed, and how the minute they go back to absorbing those same vitamins from their natural sources they automatically regain their powers of growth and of reproduction. This must surely make it quite evident that there is some quality of the soil, both for beast and for man, which is not accounted for by the ordinary chemical ingredients—the proteins, fats, carbohydrates, minerals and vitamins—and that without that quality we are all doomed to sterility. It would be an awful thing that if through the few discoveries and inventions of our modern world this race was to condemn itself to extinction.

We keep on hearing to-day of these awful dehydrating plants being put up all over the country, and of some new vitamin having been discovered. We hear of the constant spraying of vegetables—tomatoes, fruit, and, in the last four or five years, ordinary beans. If these plants were grown on soil which was rich in humus, they would not need any poison sprays at all. I should like to quote what Sir Albert Howard has said on that subject:

"Insects and fungus are not the real causes of plant disease and only attack unsuitable varieties or crops improperly grown. Their true role in agriculture is that of censors for pointing out the crops which are imperfectly nourished. Disease resistance seems to be the natural reward of a healthy and well nourished protoplasm."

I know that that must be true. Take the great market gardeners of this country, such as Mr. Secrett, of Walton-on-Thames, and Captain Wilson, in South Lincolnshire, or Dr. Pfeiffer in Holland. They have all reported year after year that fungi and insect pests were very rare in their gardens, and they employ no artificial spray. That is because they ensured that their soil was strong and had positive health, which is passed on to the plant, enabling it to withstand disease. To-day in contradistinction to that, in the Worthing area which is so famous for market gardening, many of the greenhouses have soil which is completely sterile; it has been made sterile purposely by the use of a new steam treatment. How can it be possible for a plant grown under those conditions to impart any positive health to the man who eats it?

It would be possible to go on for hours with these various examples which one hears of from time to time. Most of them, I expect, have already come to your Lordships' attention, and anyway one can read about them in many works which have been written by some of your Lordships and also by scientists and practical farmers who have been exercised by these problems. I would, however, like to draw your Lordships' attention to what I suppose is the longest-term proof in our experience which I have been able to discover, which is the case of the island of Barbados. I think about the turn of the century they were still renewing the fertility of their soil by the use of a system known as pen manuring, which was simply the use of vegetation with the waste from the live stock—oxen and mules and horses—on the island. When the West Indian Agricultural Commission came along they suggested that this process should be suspended, and that instead they should put on potash, nitrogen, and phosphates in chemical form. The first thing that happened was that the old variety of sugar cane, called the Bourbon variety, which they had used until then, began to suffer from a fungus disease and died out.

Since then none of the seedlings which have been used have proved entirely satisfactory. More and more artificials have been used in the soil and more and more virus diseases have manifested themselves. And, if that is not enough, the actual population of the island just before this war was showing signs of malnutrition, there was a great deal of unrest and rioting prevalent—all things which have never happened in the history of the island before. And yet forty-two years ago one of our greatest agricultural experts warned the West Indian Agricultural Commission of that day exactly what would occur, and every one of the prophecies he made at that time has come true. That is a fairly long-term proof which we have to hand of what can

take place when the soil loses its fertility.

I do not suppose anybody can look back to the years of a prosperous agriculture. And yet a prosperous agriculture must have a great deal to do with maintaining the fertility of the soil. I believe that the country to-day is generally worried about these problems, and it falls to the lot of your Lordships to review the facts and to sum up the evidence and decide before it is too late whether or not it is in the interests of this country to have a fertile countryside or not. There will be many people who believe that this war is the war to end wars, and that when it is over it will become easy to buy cheap food again and we shall not have to worry. I hope —I know we all hope— that the fate of the Atlantic Charter will not be the fate of the League of Nations. But all these things depend for their performance upon other countries, and surely no statesman can afford to base his plans for running a country on circumstances outside his control in other parts of the world. The first bulwark of our national safety here is our land. The first certain guarantee of the continuation of the great quality which has made the British nation what it is depends on our land, and I am sure that, if only we can keep the soil fertile, disease can and will disappear in plant, in beast and in man.

LORD GLENTANAR: My Lords, those of us who have been privileged to-day to listen to this very remarkable series of speeches may, and I hope will, look back upon this debate in the future as the beginning of possibly a series of other debates which will lead to more concrete proposals than may be possible at this stage. I will not detain your Lordships long, because there is little that can be suitably added at this hour to the very interesting things which have been said in the speeches to which we have listened, but I think acknowledgements should be made to His Majesty's Government, and especially to the Ministry of Agriculture and the Ministry of Food, of the fact that, despite the war and all its difficulties, the health of the nation is probably better than it was before the war started. But none of us will be satisfied with the progress that has been made. I think most of us agree that all is not well, and that a great running off the rails has been taking place over a long period, especially in the nineteenth century and up to the present time, when our chief guides have perhaps been the science of chemistry and the science of economics. I often feel that during this period we have been walking, so to speak, with a test tube in one hand and a cash book in the other.

We have heard of the diseases of plants, animals and man, and there is no need for me to say anything more about these, because I am sure that with them many of us are too well acquainted. But there are sometimes facts which we do not always keep in mind, not only the absence of positive buoyant health, but also the various deficiencies, mental deficiencies and so forth which c a n n o t be attributed to the cause of heredity. Proposals have been made, and I suppose are being considered, such as those that have been put forward in a memorandum proposed by members of y o u r Lordships' House, for producing after the war a great quantity of protective foods in this country. I suggest to y o u r Lordships that this is a very practical way of proceeding because of the many things that must come into the trial of this policy. The production of such things as milk, eggs, poultry, meat, fruit and vegetables require a considerable proportion of our population living on the land, and that in itself would be a corrective of the state of affairs which none of us can regard happily, when so many of our population live in the cities. The figures we have sometimes seen regarding the health and the powers of reproduction of families, which have only for a few generations lived in cities without the benefit of the enlivening addition of country blood, are very frightening. One way in which this may be to a certain extent helped is if this policy of growing these protective foods is embarked upon.

I should like to support the proposal made by the noble Lord whose Motion we are discussing, that the noble Duke (the Duke of Norfolk), in answering for the Government, should accept what so many of your Lordships have recommended—namely, that research in the very broadest biological terms should be instituted in order that we may know more clearly the relationship between man, animal, plant, and m o t h e r soil from which all spring. I should like to add that this should be coupled with a policy of keeping open the gate to those individuals who are carrying on, in field and elsewhere, experimental farming to-day. There is much that has been done, there is much material of a very interesting nature regarding the life of plant, animal, and man which has to

be investigated, and there are individuals here and abroad who are putting to the practical test farming along the lines which have been indicated. In war-time, naturally, certain concessions have to be made, but if bodies such as the war agricultural committees are to be kept going after the war, I would ask that their powers be tempered with judgment and wisdom so that experiments by individuals as well as institutions will not be hampered or stopped by the compulsory enforcement of a standardized method. If such a plan were adopted it would seriously hold back that mass of important information of a long-term nature without which research cannot be successful.

THE JOINT PARLIAMENTARY SECRETARY OF THE MINISTRY OF AGRICULTURE AND FISHERIES (THE DUKE OF NORFOLK): My Lords, We certainly feel in this House this afternoon that we are indebted to my noble friend Lord Teviot for introducing so immense a subject as that which is dealt with in the Motion which we are discussing. We have not only had a full discussion, but I think everyone would admit we have had a discussion which is in keeping with the importance of the subject. If I do not follow very closely all the suggestions which have been made, I would assure my noble friend at the outset that his remarks and those of the other speakers will be brought to the notice not only of my right honourable friend the Minister of Agriculture, but also of the Minister of Health and the Minister of Food, whose Departments are so closely connected with this subject. As a result of my noble friend putting down this Motion, he has induced the noble Earl, Lord Portsmouth, to make his maiden speech. I should like to add my own tribute regarding the noble Earl's speech. Then we had the remarkable speech of my noble friend Lord Geddes on the position in Prince Edward Island. A certain theme which seemed to run through his speech in connexion with that island was the fact that mixed farming has, to a large extent, been responsible for the state of health which the people there enjoy. I need not refer to the remarks of my noble friend Lord Bledisloe on research except to say that the Chairman of the Agricultural Research Council, Earl De La Warr, was in his place during that speech, and I have no doubt he took notice of the noble Viscount's remarks.

The Motion before the House is a somewhat complicated one. The noble Lord and others have spoken about the fertility of the land and its reaction on the health of the plant—and of the animal, and indeed of the man which consumes either the plant or the animal. The fertility of the soil, as we all know, depends on a variety of factors —adequate drainage, adequate lime, and adequate supplies of chemical plant foods. These include nitrogen, phosphates, and potash, as well as the so-called minor elements consisting of certain other chemicals that have to be present in very small quantities. Fertility is also influenced by the efficient cultivation of the land, which includes, of course, the proper control of weeds and pests, a certain amount of maintenance, and a quantity of humus—humus, perhaps, being best described as decayed vegetable matter. There is a substantial amount of agreement among agriculturists on all aspects of this problem except, possibly, the last. On this, from time to time, rather extreme views have been expressed. These views regard humus as the mysterious source not only of soil fertility, but of the health of the crop, of the live stock, and of the human population that consume both. Linked up with this view is the idea that the chemical foods which the plant needs must be manufactured in the soil from this humus and must not be applied in the form of artificial fertilisers.

Let me try and deal briefly with the separate points. Firstly, I should like to deprecate any suggestion of antagonism between chemical fertilizers and humus. Those who decry either fertilizers or humus are doing a disservice to the farmer and to the country. It is not a question of fertilizers *versus* dung, it is a question of using both to their best advantage and using them in proper proportion. There is no evidence whatever, from farming or medical experience or from the scientists, that the proper and balanced use of fertilizers has any harmful effect whatever on the soil, on the health of crops or of man. A large number of names have been mentioned this afternoon and various quotations have been given, and if I may I would like to quote two well known authorities, Sir John Russell and Sir Daniel Hall. Sir John Russell says:

"Experiments were made by three German bodies on the value of vegetables grown with animal manures and artificial manures. The results when the vegetables were given to labour Service men, were negative. When added to the food of inmates of two children's homes, the results indicated that the

vegetables grown with animal manure and artificial manure together, were *superior* to those grown with animal only."

The quotation from Sir Daniel Hall is as follows:

"When it is asserted that produce grown from artificial fertilizers has no nutritive value, lacks vitamins, or flavour or is subject to disease, my scepticism asserts itself. I only remember that the men who grow 60 to 80 tons of tomatoes to the acre must depend very largely on artificial fertilizers and that their crops are entirely free from disease and are of unrivalled quality. Disease is not a product of modern high farming with chemicals, though it may be the mark of their use in an ignorant manner."

I know that there are some soils, mostly outside the British Isles, deficient in certain minerals—iodine, copper, iron, phosphorous cobalt—which do affect the health of animals and occasionally men who live entirely on the produce of this particular land. Few people in Britain live entirely off their own land, and as regards stock we are already finding how to correct some of these troubles by the addition of the missing substances. These, however, are examples of harm arising not from the presence, but from the absence of minerals. So far as this country is concerned, our safeguard lies, as ever, in sound principles of mixed farming. Having read the Motion I naturally consulted the Ministry of Health before I came here. They told me that if the view is expressed that food produced from soil which has been fertilized by artificial manures is in some cases dangerous to health, I could say they were not aware of any medical evidence in support of that opinion. Returning to the question of humus there can be no question whatever as to its supreme importance in the soil. It increases the water-holding capacity of light soils and improves the structure and working of clays. It aids, I am told, the activity of certain useful fungi which helps in the control of certain diseases of cereals. The value of a certain amount of humus is beyond all argument, and I think it might be a mistake if we raised this question to so high a level as the realm of politcal controversy.

Let us leave these contentious and theoretical matters and turn to something practical on which we must all be agreed—the maintenance of the fertility of our land. I do not think it will be alleged that the Minister of Agriculture and his Department have been backward in stressing the importance of this for some time past and the recent resolutions from Hot Springs confirm this importance. If we have to maintain our maximum output of human food for some years yet, we can only do so from fertile land and the Minister's four-year proposals for agriculture are designed to this end. Much of our arable land is due, some of it is overdue, for cleaning and restorative crops, particularly temporary leys. Since we have to do our best to maintain the tillage acreage, we must plough more inferior grassland to take its place. The increased productiveness of these leys will require more cattle and more sheep to consume them and once again we shall, I think, be all agreed on this important corollary to the four-year plan —the improvement in quality and the numbers of our live stock.

The very success which we have achieved in increasing our tillage area necessitates sufficient live stock to consume our wider area of forage crops and temporary leys, together with the increased straw and by-products of the farm. The live stock will play their part not only in supplying milk, which is our first priority, and meat, but also build up soil fertility so that we may continue to make our contribution to the world's supply of bread corn and any other demands that may fall upon us.

LORD TEVIOT: My Lords, I must thank the noble Duke for his reply. I am a little disappointed that he has not said anything with regard to the request as to whether he would ask the Ministries concerned if they will set up after this debate in particular an inquiry or a Royal Commission to investigate this very important matter.

THE DUKE OF NORFOLK: May I be allowed to interrupt my noble friend? I am sorry if he misunderstood me, but I did say that I would bring his request to the notice of the three Departments. I thought I had made it clear.

LORD TEVIOT: I thank the noble Duke. It was my fault. I did not recollect that. Really my complaint was that he did not go as far as I had hoped he would go, but no doubt that may come in due course. There is one great disappointment which I think we must all feel. I wrote to the three noble Lords who represent the medical profession in this House, telling them that this debate would take place and expressing the hope that they would be here. Apparently they had other engagements. It would have been very instructive, I

think, if we had heard their views on this matter which is so very important to the health of the people. My noble friend the Duke of Norfolk referred to Sir John Russell. I was very glad to see in *Sporting and Country*—it used to be *Sporting and Dramatic* — two or three pages by this very remarkable man who speaks with all the authority of Rothamsted. He seems to have come round now to the compost idea. That is most gratifying to those of us who, despite the experiments that have been made at Rothamsted, have very good reasons for not accepting this idea that you can go on growing wheat, for instance, on the same soil if you dope it with artificials. It is admitted now that they used new seed all the time.

I know of a certain experiment where a plot was divided into three and doped with artificials. The seed in the first year gave a good crop, in the second year it was very bad, and in the third year it was sterile. That is what we knew would happen if you did not maintain humus in the soil. It is absolutely necessary to have humus in the soil if you are to maintain its life and also maintain the health of the product. I do not want my noble friend to think I am attacking him. What I want is that this matter should be investigated right up to the hilt. I can quite understand some people thinking there is no proof, but I have myself, and no doubt other noble Lords have also seen definite proof that the land treated in a certain manner does produce the results I have indicated. We want that question considered more fully than is possible in a debate here. We want research. There is one fact I can never get away from. It is this. No matter how much he may try, the chemist cannot make life. It seems to me that if there is no life in the soil there is no life in the plant, the animals deteriorate, and in consequence man deteriorates. I have a certain hope that as a result of this debate, initiated by me in all humility and supported by men who have tremendous practical experience and have also written great works on this subject, that the Ministries concerned will take this subject very much to heart and will start as soon as possible the most exhaustive investigations. I again thank my noble friend for his reply and I beg leave to withdraw my Motion.

Motion for Papers, by leave, withdrawn.

## Reader's Correspondence

Rodale Press:

I am glad to see that somebody has attacked the folly of ploughing. I have thought it useless and evil for over thirty years.

I was born on a farm, but I am no farmer. I have done some farm work but I don't know farming. My thought that ploughing is evil has always been scoffed at by my farmer friends.

When as a high school lad back before World War I, I discussed this idea with the teacher of agriculture, he assured me that the ploughing was necessary to break up the soil and bring the underlying elements up within reach of the plant roots.

I too, noticed that ploughed land washed away and blew away more than the unploughed field. But I knew nothing of the evils of erosion. I noticed that the weeds around the hedge rows and in the meadows grew and flourished in dry weather when the crops were languishing and dying. I thought the ploughed land dried out faster.

I once worked for a farmer who raised only cotton. As soon after a rain as it was possible to work in the field I went in there with a cultivator and turned the top surface of the soil over. I noticed that in two days it was dry and dusty and blowing away and the crop was suffering for lack of moisture.

I discussed this with an agricultural expert. I asked: "Why turn the dried-out top-crust under and turn the moist undersoil up to sun and air? Does it not cause a more rapid loss of moisture?" He assured me that forming a layer of loose dry soil on top prevented rapid evaporation of moisture from the soil beneath.

I did not know. I was only an inexperienced kid. Perhaps he was right, I thought, but how explain the better condition of the weeds. When I asked about this, I was told that weeds and wild vegetation are simply hardier than cultivated plants. At that time I accepted this explanation, but later, when I became more matured and better informed I asked: "Why are cultivated plants less hardy? What causes them to be less hardy"?

I still believed it all to be due to a drying out of the soil due to ploughing and cultivating. I knew nothing of the part played by the decaying plants in feeding the new plants and in holding moisture. There was and is much about farming and about soils that I do not know. But I was never convinced that ploughing was essential.

You may well imagine my satisfaction when I read in Sept. *Organic Gardening* the article about Faulkner's findings. They not only confirm my own thoughts, but go much beyond them. Best of all, he has put the matter to a practical test and it works, whereas with me, it existed only as a theory, or perhaps, more properly, only a suspicion.

Here at my *Health School*, where I have sixteen acres of land, I have tried to raise a garden on a few occasions. I have failed each time. I have attributed this failure to the thin soil (it is 6 to 12 in. on top of thick rock), but I have noticed that while my garden failed, the weeds and grasses in the unploughed portions flourish luxuriantly. I can raise vegetables only by irrigating them twice a week, the weeds go through our dry summers without irrigation and do well.

I don't expect to become a farmer, but I hope this ploughless farming is given extensive tests, for I believe it will not only work, and save our soil, but that it will reduce the work farmers and their families have to perform.

With best wishes for the continued success of your work, I am

Yours for Health, Truth and
Medical Liberty,
Herbert M. Shelton, D.P., N.D.,
San Antonio, Texas.

*Answer*

Dear Dr. Shelton:

Thanks a lot for your letter of November 24th. We feel that the conditioning of the soil with composts is more important than the question of whether to plow or not to plow. The trouble with the no-plowing theory is that there aren't the correct implements available for this work and secondly in many parts of the country, the weeds would get a start ahead of the crop. Thirdly, it takes about three times as much work to prepare the soil by the no-plow method and fourth, it is very difficult to plant seed with present-day seeding equipment (grain-drills for wheat, as an example) through the stubble, and other residues which remain on the soil when it isn't plowed. Theoretically it looks sound, but there seem to be practical difficulties.

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Organic Gardening:

1. If the Indore Process is not effective in winter, should stable manure (cow) be kept separate from the bedding until spring when a new heap can be started? Normally it all goes down the hole together. (A neighbor's barn.)

2. In making my own heap, I have gathered manure daily from the yard where my neighbor's horses stand around, at and under my barn. (We have no stock.) This, of course, loses the urine. What rain we have had supplies the moisture. While there was steam from one of the heaps (from "chimneys") at first, the heap has not turned at all white inside, so doesn't look ready to turn. I may have used too much dirt in my layers. What should my program be now, with winter setting in? Cover the heap with hay to prevent too much moisture? Or should I turn it and then cover?

3. In a second heap, (not having read Lady Balfour's article, stressing the importance of mixing the different kinds of vegetable material) I used unmixed layers of matter as it became available—weeds, garden refuse, leaves, straw, etc. And cold weather has set in before the heap has been built up more than 3 feet. What should I do now?

4. If neither heap works out as it should, can't I just spread and harrow it into the garden in the spring, even if not complete humus?

You got me started on this program (my first year on a farm,) and I trust that it is legitimate for me to come back with a few questions.

Carrington Howard,
North Stonington, Conn.

*Answer*

Dear Mr. Howard:

In answer to your first question. Manure is never kept separate from the bedding. When you clean out the stable the entire bedding including the manure, is handled as one. Compost heaps may be made in the winter time, but do not act until the spring. There is a question also of whether you have earth available at that time of the year. Otherwise instead of using earth you can use a slight sprinkling of finished compost in its place.

Regarding your second question, it does not matter whether

the inside of the heap has turned white. It should be turned over in three weeks from the time it was made. It is an excellent idea to use a hay mulch on the top of your heaps. If there is too much moisture, however, the use of a hay mulch will not reduce it, in fact, it will absorb more rain. In that case it is best to cover it with canvas or some other material.

3. As we have said in answer to the previous question, you can take your material even in the winter time and make it into a heap.

4. If you need the compost badly in the spring, it is advisable then to spread it even though it is not quite finished, rather than not to use any fertilizer at all. It will not produce as good results as if it were composted completely.

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J. I. Rodale:

I received Sir Albert Howard's book, which you sent me. I have just had enough time to look into it, but shall read it soon, and I know that I shall enjoy it. I enjoyed a recent article of his in your magazine which related to the improvement of the animals with the improvement of the soil, this applies equally to human beings, as I have observed, and this is the phase that I am definitely interested in with our practice of drugless healing. I have seen cattle and horses lose their ticks after feeding on better herbage. Good health is the result of good nutrition of soil, plants, animals and human beings.

Your magazine is splendid and timely. Your editorials are very informative too.

Dr. Juan Amon-Wilkins,
Isle of Pines, Cuba.

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Dear Mr. Rodale:

Will you be good enough to answer the following question:

What do you do about the potato bug? All the farmers use arsenate of lead, which is the very thing you preach against. So in lieu of this poison, just what can be done?

Thanking you for any information you are able to give me, I remain,

A. M. Wallace,
Lynn, Mass.

*Answer*

Dear Mr. Wallace:

Regarding the potato bug, we had a nice crop of potatoes this spring. It consisted of about a quarter of an acre. We planted whole potatoes instead of cutting them up and did absolutely no spraying of any kind. There were practically no potato bugs and the result was a nice crop of potatoes.

A new invention has just been placed on the market which we are investigating. It consists of a suction system which can be attached to a tractor. It was designed with a view of combatting the boll-weevil in cotton, but can also be used for the potato bug. The tractor drives up and down the rows and this device sucks the bugs into a bag.

I am so glad to see that people with mechanical ability have finally thought up something which is not detrimental. This looks like an excellent idea. There is an interesting by-product of this method in that the bag of potato bugs may be emptied into a poultry pen so that the chickens could get at them.

We are writing to the inventor and will probably announce in our magazine more details in a later issue.

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Alex R. Nisbet,
Plainview, Texas
Dear Sir:

We have read of the blower and bagger that you have invented to take care of the boll-weevil and potato bug and to me this represents a revolution in the method of taking care of insect pests. We all know the harm that is being done by poisonous sprays to get rid of insects and it is most interesting to hear of a mechanical method like yours that can dispose of the insect without harm to the plant and to the soil.

If there is an Agricultural Hall of Fame, you should be in it. To me this is about the most astounding piece of agricultural news that I have read in a decade and I trust that your idea will be spread all over the country and I hope you will enjoy the success you deserve as a result of your idea.

There are certain insects that lay eggs under the leaves in the early spring. How would you attack this problem?

Sincerely yours,
J. I. Rodale.

Organic Gardening:

Articles by Roger W. Smith appearing in Organic Gardening are well thought out and written. Yet as he speaks of "Starting the New Garden" in your October issue I think he makes a mistake to suggest, quote: "No trees or buildings should be within fifty yards of the area selected. . . ."

It seems to me this is a one-sided and extreme viewpoint. My reasons for saying this are explained at length in the inclosed article. I believe it might do your readers some good to have knowledge of this other type of vegetable garden.

Robert Ross,
Cresco, Penna.

This letter was submitted to Roger W. Smith who replied as follows:

Dear Mr. Rodale:

Thanks for your letter of Nov. 16th enclosing comment from Robert Ross regarding the ideal situation for a vegetable garden. I'm more than glad to go into detail because it seems that this point receives too little consideration from amateur vegetable growers.

During a survey of a great number of new Victory gardens this summer our advisory committee found that the one factor limiting maximum production and *overshadowing all other causes combined* was the nearness of trees or buildings.

We were, of course, studying the vegetable garden. Garden vegetables usually must reach maximum growth, the fruiting or root developing stage. We were aiming at peak production. Flower gardens succeed under much less perfect conditions.

In the case of large buildings, failures or partial failures resulted from the following well-known causes:

a. Subsoil removed during excavation of foundations had been dumped on top soil and spread to form a large infertile area.

b. Normal traffic tramped down and precluded proper fencing, cultivation, etc.

c. The effect of the shade thrown by the building, especially if it stood on the south side, was most marked.

Nearby trees. The extent to which a group of large trees can throw shade is even more noticeable. Observe the area shadowed by them when the sun has started to decline.

Some vegetables will grow in partial shade, they are few. Most of them require "sunny, open" surroundings.

Immediately surrounding a group of trees there is a well recognized area where vegetables usually fail because of the effect of tree roots and direct shade. But surrounding this area is still another wide zone effected by the trees and forming a very troublesome borderland for the vegetable gardener.

For trees have a subtle way of influencing their surroundings to their own advantage. They throw leaves and twigs, needles and seeds, and work hard to make the area suitable for their own progeny far beyond the place they occupy. All this has a limiting effect upon low growing plant life. They interfere with normal movement of water in the soil and with air drainage.

In our survey we found many very successful Victory gardeners who had wisely cultivated desirable areas at some distance from their homes rather than contend with doubtful surroundings.

And we recalled the pattern of large grounds planned in the old days—invariably the vegetable garden was set as far as possible from the house,

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Thos. J. Barrett,
Earthmaster Farms, Box C-10,
Roscoe, Calif.

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A phamphlet of 64 pages answering many questions about the best way to make compost. This book consists of material that has appeared in Organic Gardening from time to time.

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**Emmaus, Pa.**

with lawns, flower beds, herb garden, near the home.

The man with the small place —what is he to do? That of course, depends upon the limitations of his place. If only one small building, say a house, is involved, and that standing anywhere near the exposed side of the garden its effect might not be bad even though it is nearby.

A few trees may sometimes be ignored, especially if their lower branches are removed. There are many methods by which an expert would overcome the difficulties of each particular case.

Unfortunately, the amateur vegetable gardener not only doesn't understand what to do to remedy conditions, he usually doesn't even recognize the difficulty when it exists. As like as not he blithely plans his vegetable garden without regard for incredibly adverse surroundings. When his vegetables fail, he will perhaps blame lack of fertility or insufficient composted material.

In such cases we recommend that the home grounds be used for ornamentals, flowers, etc. and that any serious attempt to produce vegetables be made upon ground more suitable.

In the selection of allotments for Victory gardens, we laid down the "fifty-yard rule" as an ideal. And in making our choice for the several large sections used as allotments we didn't always quite succeed in keeping that distance. We used the rule as a guide, and we feel that the benefits of the attempt were well worth the effort.

Now that surprisingly large crops of fine vegetables have been harvested by those who used the allotments, we feel that the open sunshine and fertile humus of these areas was responsible for the large supply of healthful foodstuffs produced, and that the slight inconvenience of the distance was really worth while; that our attempt at keeping "the fifty-yard rule" was r e a l l y worth while.

With very best personal regards, I remain,

Roger W. Smith.

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Gentlemen:

In view of the fact that I am interested in gardening at the present time, as a hobby, rather than a means of earning money, I have decided to terminate my subscription to your publication.

However, in fairness to you, since you were c o u r t e o u s enough to answer my two letters, I am citing below a few of my observations after reading the seven issues of Organic Gardening, and contrasting the information contained therein, with the facts as disclosed in the other reference material which I have available.

1. Large scale composting would be out of the question, unless labor and the materials to be rotted were procurable in quantities and at a very low cost. Also, as a general thing, sufficient water would not be at hand, since, it has been estimated that 3 tons of water would be needed to complete the process for each 1 ton of materials. Maryland happened to be suffering from an extended drought this past season, so nearly all of the water requirements must be supplied from sources other than rainfall.

2. Should it be necessary to purchase farm manures, bone meal, tankage, meat scraps, etc.

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the ultimate cost would be prohibitive.

3. During this particular period, where labor is required for Defense Projects, and the use of gasoline equipment is restricted, it would be virtually impossible to collect the refuse from slaughter houses and poultry and fish markets. Furthermore, where the property owner didn't happen to have a truck or time to make this collection himself at regular intervals, this source of obtaining recommended additions to the compost heap must be abandoned.

4. Animal manures and animal wastes have been condemned as carriers of parasitic diseases.

5. A recommended substitute for composting, is that of green manuring, augmented by commercial nitrogen fertilizers —since the nitrifying bacteria take first call of available ammonia and this to the detriment of growing crops.

6. While you have denounced the practice of employing Superphosphates, it is a known fact that sulphur is converted into sulphuric acid by bacteria—and this acid actually makes the phosphate available for plant food from rock phosphate or bone meal which might be applied to the soils. Also, there are certain crops which require a reasonable percentage of available sulphur if normal growth is to be achieved.

My suggestion to you would be that you give the readers of your publication a series of articles dealing with Micro-organisms, and the manner in which they aid in rendering plant food available for growth of sundry crops.

J. W. Rothenhoefer,
Frederick, Md.

***Answer***

Dear Mr. Rothenhoefer:

Replying to your letter of November 3rd, we will take up your letter item by item.

1. You state that large scale composting would be out of the question. Sir Albert Howard describes a farm of 15 acres owned by Mr. Kenneth Crawley in England who applies every year ten tons of humus to the acre, all obtained from his own 15 acre farm. In addition, he applied 165 tons a year to one acre of garden on the farm which he also obtained from his 15 acres without going outside for any material. When a farm once gets going on the organic basis (it takes a few years) it needs only 5 tons of humus an acre. You talk about a drought in Maryland this summer. It seems ironical that you are conflicting with your own ideas because ground well treated with humus can withstand droughts so much better than other soil, so much so that in many cases crops are saved which would otherwise be lost. In most cases the average rainfall is sufficient for the compost heaps, but where there is not enough water, the heaps would simply have to be finished without the necessary water which would mean that it would take longer and perhaps have to finish the rotting process in the ground.

2. It would not be practical to farm if you had to purchase farm manures but in home gardening that should not be a factor. The answer here is if you are going to farm, it is important to have live stock as part of the plan.

3. We do not recommend that farms, that are not using the compost method, start on it now under war conditions. It would be best to wait till after the war. While some farmers have used trucks to get material from outside sources for compost, this is really not necessary. There is sufficient material that goes to waste on the average farm each year that can be used for making the compost.

4. Controlled experiments have proven that your statement is incorrect. It is true if the animal material is applied direct to the soil, but where it is composted, it becomes safe.

5. Green manuring is all right where a farm is fertile and the green material is digested quickly by the bacteria fungi and earthworms in the soil. In many cases farmers could not seem to understand why the application of green manure crops actually gave them poor results because it took over a year for the ground to digest the material.

6. Here also you have stuck your chin out. Lady Eve Balfour in her new book called "The Living Soil", published in England, has shown without a question of a doubt that the application of sulphates to the soil encourages toxin-producing bacteria to form which seem to kill off fungi which are needed to break down organic matter. Lack of aeration is a factor favoring the activity of sulphur-reducing bacteria. You are right when you stress the importance of studying micro-organisms because such a study reveals without a question of a doubt the fact that the use of the so-called chemical fertilizers reduces the biological life of the soil which life includes bacteria, fungi, earthworms, etc.

# AN AGRICULTURAL TESTAMENT

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Formerly Director Institute of Plant Industry Indore, and Agricultural Adviser to Central India and Rajputana.

Sir Albert Howard C. I. E., M. A.

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This is the recognized standard text book for gardeners and farmers who wish to change from the use of ordinary chemical fertilizers to home-made organic fertilizers. Sir Albert Howard has forty years of active experience in the field of organic fertilizers and is the accepted leading authority on the subject.

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